

ROYAL BOTANIC GARDENS, KEW.

BULLETIN

OF

MISCELLANEOUS INFORMATION.

No. 4]

[1924

XII—A NEW NATIONAL PINETUM.

The need of a site other than Kew where a national collection of conifers and taxads could be grown for purposes of study by botanists, foresters, horticulturists and the public generally, has for many years been manifest. It is true that a very extensive collection of species in a presentable condition may still be seen at Kew, especially of those belonging to *Pinus*, *Cupressus* and the *Taxaceae*, but the best of these attained their present size and character before atmospheric conditions got so bad. Certainly it has been impossible for several decades past to show at Kew creditable examples of most of the spruces and firs, two groups which include some of the handsomest of all conifers.

Through the courteous co-operation of the Forestry Commission a beginning has been made to establish a new national pinetum. After a careful inspection by the Director and Curator of various sites suggested by the Commission, one at Bedgebury in Kent has been selected. The first requisites of such a site are of course a pure atmosphere and a good soil; it is desirable also that the pinetum should be reasonably accessible. There is no doubt that the area selected at Bedgebury, about fifty acres, meets the first requirements. A specimen of *Abies grandis* 100 feet high, perfect in health and shape, as well as a number of Douglas firs and other conifers of equal quality already growing there, are sufficient proof of that. The contours of the land are also admirable for the display of fine trees, the centre of the area being traversed by a well-made road from which on either side the ground rises fairly sharply. At the lower end a small lake adds to the beauty of the scene and will afford an appropriate setting for *Taxodium distichum* and other moisture-loving conifers. Bedgebury is about ten miles east of Tunbridge Wells.

and twelve miles south of Maidstone ; by train it is most easily reached from Cranbrook Station on the Southern (S.E. and Chatham) Railway.

The Bedgebury property came under the control of the Forestry Commission on April 1st, 1924, and the first task will be to surround the selected area with rabbit-proof fencing. Although fifty acres only have been allotted, the area may in future be indefinitely expanded, for in addition to the maintenance of a botanical collection of species and varieties of all conifers and taxads hardy enough to be grown there, the aim is to plant also experimental plots of likely kinds under forest conditions to test their value for the production of timber. The ground is at present more or less wooded and it will be possible, as areas are cleared for planting, to leave belts of trees for shelter.

In regard to control, the general management will be in the hands of the Forestry Commission, but Kew will supply the trees and superintend the planting of the botanical collection. A joint permanent committee to arrange the lay out, the execution of the work, etc., has been formed, consisting of Sir John Stirling-Maxwell, Dr. A. W. Hill, Mr. W. J. Bean, Dr. A. W. Borthwick and Mr. H. A. Pritchard. The first consignment of over three hundred plants was despatched to Bedgebury from the nurseries at Kew on April 1st, 1924.

XIII.—CONTRIBUTIONS TOWARDS A PHYLOGENETIC CLASSIFICATION OF FLOWERING PLANTS: IV.*

J. HUTCHINSON.

PROPOSED REARRANGEMENT OF FAMILIES COMPRISING THE ARCHICHLAMYDEAE.

Now that the genera of a large number of the families comprising Bentham & Hooker's *Polypetalae* and *Monochlamydeae* have been examined in detail in connection with these studies, it seems desirable that the approximate arrangement of the families resulting from the amalgamation of these groups, the *Archichlamydeae*, should be indicated according to the principles of classification given in the first contribution to this series of papers (*Kew Bull.*, 1923 : 73-4). This list of families may prove useful for those who now perhaps find the system of Bentham & Hooker somewhat inadequate, and who may not be in agreement with the later system of Engler & Prantl. In a recent paper before the Linnean Society of London ⁽¹⁾, Parkin made the following remark :—"A linear arrangement

* Continued from *K.B.*, 1924, p. 66.

(1) Parkin in *Proc. Linn. Soc. Bot.* 1923 : 51-65.

of families is, of course, merely a makeshift, but at the same time an unavoidable one. As far as possible it should follow evolutionary lines, and after that its practical value should be consulted. Engler's system in the writer's [Parkin's] opinion fails to fulfil the first condition, and granting this there is no reason in retaining it on the second account, for it is no improvement on Bentham and Hooker's arrangement from the practical point of view. It is a matter of regret that certain recent English systematic publications have been arranged on Englerian lines, thus departing from the long continued practice of commencing British floras with the *Ranunculaceae*."

During recent years much has been written on the origin of the Angiosperms, and there is now a considerable body of opinion ⁽²⁾ in opposition to the general theory underlying the Englerian System, and in favour of a rearrangement of the Bentham & Hooker System. But beyond the determination of the most primitive group from which a classification should be built up, not much further progress has been made, excepting the work of Hallier in Germany, and the late C. E. Bessey in America. There is not space here to discuss the numerous suggestions of Hallier, some of them rather startling, but the classification proposed by Bessey requires consideration. Bessey had many remarkable and original ideas on phylogenetic classification; but acquainted, as he was no doubt, with little beyond the North American flora, he probably had not the opportunity to acquire a comprehensive knowledge of the constituents of many of the families with which he had to deal. Apart from his rather drastic amalgamation of the *Archichlamydeae* (*Polypetalae* + *Apetalae*) with the *Metachlamydeae* (*Gamopetalae*), some of his suggestions as to affinity are difficult to follow. For instance it would be troublesome to trace the *Ebenales* as finding their origin in any of the families he included in his *Caryophyllales* (Ann. Miss. Bot. Gard. 2: 116). Again, anyone with an intimate knowledge of the families constituting his *Primulales*, i.e. *Primulaceae*, *Plantaginaceae*, *Plumbaginaceae*, *Myrsinaceae*, and *Theophrastaceae*, would probably hesitate to suggest that they had given rise to the *Gentianales*, *Polemoniales*, *Scrophulariales*, and *Lamiales*. One would rather look for the origin of *Ebenales* in some woody family. Then a close study of the genera of *Primulaceae*, *Plantaginaceae*, *Plumbaginaceae*, *Myrsinaceae* and *Theophrastaceae* would probably lead to the conclusion that these families were themselves the ultimate development of various groups of very different affinities in the *Archichlamydeae*, the *Primulaceae*, *Plantaginaceae*, and perhaps part of the *Plumbaginaceae* from *Caryophyllales*, and the *Myrsinaceae* from the *Rhamnaceae*.

(2) C. E. Bessey in Bot. Gaz. 24: 145-178 (1897). Arber & Parkin in Journ. Linn. Soc. Bot. 38: 29-80 (1907). C. E. Bessey, "The Phylogenetic Taxonomy of Flowering Plants," in Ann. Missouri Bot. Gard. 2: 109-164 (1915).

BASIS FOR A REARRANGEMENT OF THE ARCHICHLAMYDEAE.

As previously contended (*Kew Bull.*, 1923: 70), the convenience of retaining the *Metachlamydeae* (*Gamopetalae*, *Sympetalae*) can hardly be gainsaid, though a rearrangement of the families within this group, and their affinities with the *Archichlamydeae*, will presently be suggested.

It is certain that no linear sequence can adequately express a phylogenetic classification, and the present proposals are based on the theory of parallel evolution. Bentham & Hooker's groups *Thalamiflorae* and *Disciflorae* are taken to form the basis of the system. Thus a considerable portion of their classical work in the *Genera Plantarum* is preserved. The hypogynous petaliferous flower with numerous and free parts is taken to represent the earliest floral type. Several basal groups are then recognised of which the Orders *Magnoliales* ⁽³⁾ and *Ranales* are taken to be the most primitive, and from which most of the other basal groups may be traced. Into this line allied families from the *Calyciflorae* and *Monochlamydeae* are brought into their nearest affinities. In the case of *Magnoliaceae*, however, no petaliferous "Calyciflorae" family, excepting the monotypic *Eupomatiaceae*, is considered to be nearly related, the closest allies after *Anonaceae* being the apetalous *Laurales*, though there is a considerable gap between them. Sometimes the petaliferous Calycifloral group follows immediately after the Thalamifloral basal group and its allies, according to whether the petaliferous or apetalous families are the more closely related. Thus in the group *Caryophyllales*, the apetalous *Polygonales* and *Chenopodiales* precede the petaliferous *Lythrales*, because the former appear to be more closely related to the basal group *Caryophyllaceae* than are the *Lythrales*. But as a rule the more progressive perigynous group comes immediately after the basal hypogynous group.

It should also be made clear that the approximation of families at certain points in this list does not necessarily imply that they are in any way closely related. For instance, *Myristicaceae* (No. 14) is very far removed from *Ranunculaceae* (No. 15) in affinity, although it precedes it in the list. It simply means that *Myristicaceae* is considered to be the most reduced of the families belonging to the *Magnoliales*-*Anonales*-*Laurales* phylum, and is therefore placed at the end of that group. Then we have to start afresh with another primitive family, the *Ranunculaceae*, whence we proceed on the one hand by reduction as far as the apetalous family *Lacistemaceae* and on the other by a progressive series through the *Papaveraceae* to the very natural family *Cruciferae*. Similarly *Lacistemaceae* (No. 30) is not at all related to *Papaveraceae* (No. 31); neither is *Balsaminaceae* (No. 70) to *Lythraceae* (No. 71), nor *Proteaceae* (No. 82)

(3) See Hutchinson in *Kew Bull.*, 1921: 186.

to *Dilleniaceae* (No. 83), and so on. These breaks in affinity are indicated by lines. It should also be noted that the Englerian group *Parietales* is considered to be unnatural and is split up, part of it being regarded as the intermediate stage towards syncarpy, the parietal placentation remaining as a fixed character in the most advanced side branches of the herbaceous Ranalean phylum, such as the *Polygalaceae* and *Cruciferae*. Another part of *Parietales* will be found in that part of the arboreal phylum, for the basal type of which I have selected *Dilleniaceae*. These are the *Bixales* which may be regarded as the intermediate stage towards the syncarpous type of flower represented in the *Theaceae* and *Tiliaceae*, and part of the great and mostly arboreal Rosalean⁽⁴⁾ plexus. From the last named, and especially by way of a family like *Hamamelidaceae*, the much discussed group "*Amentiferae*" is considered to have been derived by reduction and specialization of the inflorescence, wherein the flowers, having become mainly unisexual and unattractive to insect life, have reverted to the more primitive anemophilous condition. I consider the suggested relationship between *Salicaceae* and *Tamaricaceae* to be due to parallelism and not to true affinity.

The *Tiliales-Malvales* are placed before the Rosalean phylum, although as a whole they are generally more advanced, and the *Euphorbiaceae* follow them. The *Euphorbiaceae* appear to be a heterogeneous mixture of apetalous types probably derived from the *Flacourtiaceae*, *Malvaceae*, *Sterculiaceae*, *Tiliaceae*, *Celastraceae*, and *Olcaceae* and perhaps several other families. Even so it is best to retain it, for convenience, more or less as now defined, but later it is hoped to point out the true affinities of some of its groups. The diagram on p. 118 is intended to illustrate more clearly the views of evolution here put forward.

Perhaps rather too much prominence may have been given to the *woody* and *herbaceous* habit. It is significant, however, that many very natural families are either entirely woody or entirely herbaceous. Examples of the former are *Magnoliaceae*, *Anonaceae*, and *Lauraceae*, etc., of the latter *Ranunculaceae*⁽⁵⁾, *Papaveraceae* and *Cruciferae*. And in the rather primitive groups, at any rate, the difference in habit is accompanied by a marked difference in the structure of the stomata; in the woody group the guard-cells are usually accompanied by special subsidiary cells parallel to the pore, whilst in the early herbaceous groups the guard-cells have no special subsidiary cells. It is difficult to suggest just what the significance of this different type of stoma represents. Of course in more advanced groups the two types are often found in the same family, the elements of which are brought together perhaps by parallel

(4) It is probable that some herbaceous *Rosaceae* have not had a common origin with their ligneous associates.

(5) *Clematis* is very softly woody.

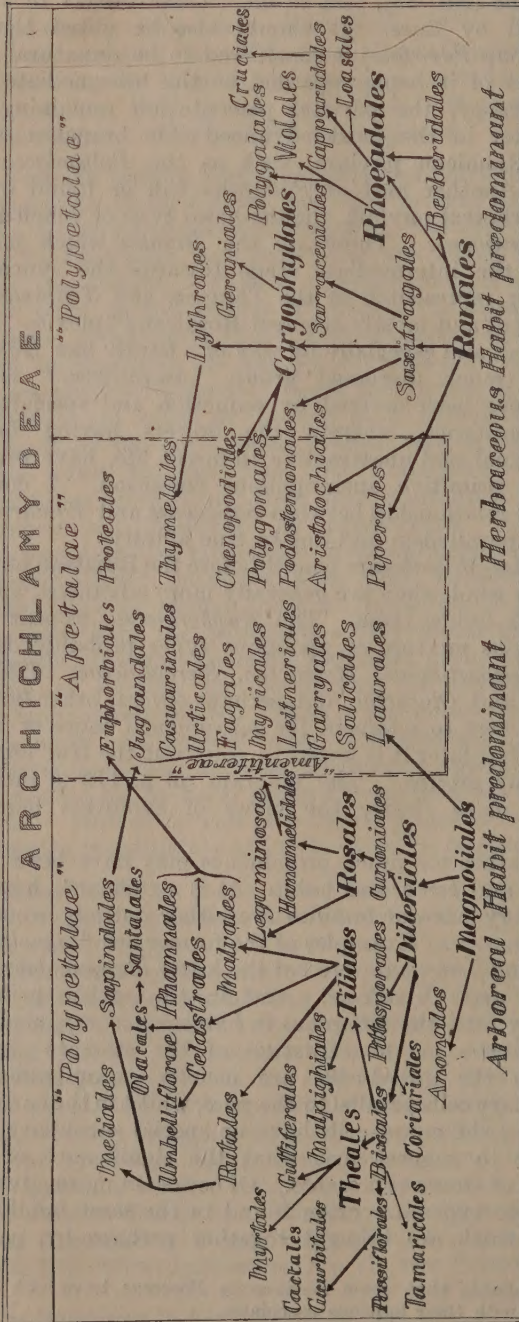


Diagram showing the probable course of evolution of the Archichlamydeae. The group is theoretically divided into two, an Arboreal Phylum and a Herbaceous Phylum, starting with the Magnoliales and Ranales respectively. From these separate but more or less parallel stocks as basal points, an attempt is made to trace the probable development of the other main groups enumerated in the appended list.

evolution. It seems significant that large natural families such as the ligneous *Rubiaceae* should have a characteristic type of stoma.

The sequence of groups set out below aims at bringing nearly related families into closer approximation than formerly, and is an attempt to show the results of parallel evolution and reduction. It should not be forgotten, however, that we have to deal mainly with the results of evolution and have not now before us the complete "phylogenetic tree". Many of the intermediate stages now represented by gaps were probably, during the long course of evolution, quite tentative and experimental and soon gave way to more advanced and permanent types. For it would be quite as absurd to suggest that the family *Fumariaceae* has been evolved from the *Papaveraceae* as they appear in the world to-day, as it would be to say that man has sprung from the existing types of simians. But just as the basal stock of simians may have split up in the dim past into several groups, one of which has developed into the genus *Homo*, so may the *Fumariaceae* have similarly branched off from the ancient papaveraceous stock and developed by a long process into the family as it appears to-day.

Accustomed as the writer has been for nearly twenty years to taxonomic work in a herbarium arranged after the De Candolle System as expressed in the *Genera Plantarum* of Bentham and Hooker, his proposals for a rearrangement of the *Archichlamydeae* are naturally not a little influenced by that system. A glance at the sequence of families below, however, will show that he has not hesitated to follow the maxim of John Stuart Mill "that any man who seeks the truth must follow his researches to their conclusions wherever they may lead"; and whatever else may be said of the results arrived at so far, no labour has been spared in acquiring them.

Archichlamydeae.

NOTES ON AFFINITY (ORIGIN AND FURTHER DEVELOPMENT).

SEQUENCE OF ORDERS (COHORTS) ⁽¹⁾ AND FAMILIES ⁽²⁾.

GENERAL CHARACTERISTICS ⁽³⁾ OF ORDERS (COHORTS).

1. MAGNOLIALES Brongn. (emend.)

1. Magnoliaceae.
2. Winteraceae.
3. Schizandraceae.
4. Himantandraceae.
5. Lactoridaceae.
6. Trochodendraceae.
7. Cercidiphyllaceae.

Entirely woody groups indicating ancestry of the following also predominantly woody groups beginning respectively with *Dillenioides*, *Cunonioides*, *Tilioides*.

Hypogynous; ♂ becoming ♂ ♀ with reduction; acyclic to cyclic; apocarpous; petals present; stamens ∞, free or rarely in a mass; endosperm copious, not ruminate; embryo minute.

2. ANONALES Lindl.

8. Anonaceae.
9. Eupomatiaceae.

More or less fixed types clearly related but more advanced than the above; tropical distribution.

Hypogynous to rarely perigynous; ♂; apocarpous to rarely syncarpous with parietal placentation; petals present, occasionally gamopetalous; stamens ∞, free; endosperm copious, markedly ruminate.

⁽¹⁾ The Orders (Cohorts) here recognised are much smaller conceptions than those of either Bentham and Hooker or of Engler, and correspond more with the Suborders (Unterreihe) of the latter. So far as possible nomenclature according to priority is used for these groups.

⁽²⁾ Family names mainly as in Bentham and Hooker, Genera Plantarum, but with many additional segregate families; where Englerian names differ they appear in brackets.

⁽³⁾ The characteristics given here are quite general and do not account for exceptions, which occur in several of the orders.

3. LAURALES Lindl.

- 10. Monimiaceae.
- 11. Lauraceae.
- 12. Gomortegaceae.
- 13. Hernandiaceae.
- 14. Myristicaceae.

Reductions from the *Magnoliales*, approaching most nearly the *Winteraceae*.

Hypogynous to perigynous; ♀ or ♂ ♀; cyclic; apocarpous to monocarpellary; no petals; stamens definite, free; endosperm copious, plain or rarely ruminant or absent; embryo minute.

4. RANALES Lindl. (emend.).

- 15. Ranunculaceae.
- 16. Cabombaceae.
- 17. [Ceratophyllaceae] ?
- 18. Nymphaeaceae.

Hypogynous to rarely perigynous; ♀; hemicyclic to rarely cyclic; apocarpous; petals present; stamens ∞, free; endosperm copious, plain, very rarely absent; embryo minute.

5. BERBERIDALES Lindl. (emend.).

- 19. Berberidaceae.
- 20. Circaeastraceae.
- 21. Lardizabalaceae.
- 22. Menispermaceae.

Hypogynous; ♀ to ♂ ♀; cyclic; one or few free carpels; petals present, small; stamens definite, free; endosperm copious, sometimes ruminant; embryo small to large; herbaceous to low woody or climbing habit; wood often with broad medullary rays.

6. ARISTOLOCHIALES Lindl.

- 23. Aristolochiaceae.
- 24. Cyttinaceae (Rafflesiaceae).
- 25. Hydnoraceae.
- 26. Nepenthaceae.

Hypogynous to epigynous; apetalous; ovary superior, half-inferior to inferior; stamens ∞ to few; parietal to axile placentation; endosperm present or absent; small to large embryo; herbaceous to climbing habit with wood as in *Berberidales*; some parasites with reduction of leaves.

Herbaceous (often with scattered vascular bundles) to softly woody groups (wood of special type probably derived from herbaceous) from which may have been derived the following herbaceous progressive groups beginning with *Rhoeadales*, *Saxifragales*, herbaceous *Umbelliflorae*, and the reduced and degraded *Aristolochiales* and *Piperiales*.—Considerable affinity with Monocotyledons.

See note under *Ranales*; probably reduced *Berberidales* by way of *Menispermaceae*.

7. PIPERALES Lindl.

27. Piperaceae.
 28. Saururaceae.
 29. Chloranthaceae.
 30. Lacisternaceae.

No perianth (usually); ovary mostly superior; placentas parietal to subaxile; endosperm copious; embryo minute.

Reduced types from the *Ranales*, often with scattered vascular bundles as in *Monocotyledons*.

8. RHOEADALES Bartl. (emend.) (Rhoeadeae.).

31. Papaveraceae.
 32. Fumariaceae.

Hypogynous to rarely subperigynous; $\bar{\sigma}$; cyclic (except sometimes the stamens); petals present; syncarpous; parietal placentation; stamens ∞ and free to definite; endosperm copious, plain; embryo minute; flowers actinomorphic to zygomorphic.

9. LOASALES (Engl. subord.) (emend.).

33. Turneraceae.
 34. Loasaceae.

Hypogynous to epigynous; stamens numerous and sometimes in bundles, to few; syncarpous with parietal placentation; endosperm copious; embryo straight; seeds often strophiolate; flowers actinomorphic.

Herbaceous to more or less woody groups most of which have developed into fixed types and have not given rise to further evolution; gradual increasing zygomorphy of the flower with reduction of stamens and ovules.

10. CAPPARIDALES (Engl. subord.).

35. Capparidaceae.
 36. Moringaceae.
 37. Tovariaceae.

Hypogynous or subperigynous; $\bar{\sigma}$; petals present; syncarpous with parietal placentation; carpels 2; stamens numerous to few, mostly equal; endosperm absent; embryo variously folded; flowers actinomorphic to zygomorphic.

11. CRUCIALES Lindl. (emend.).

38. Cruciferae.

More or less as above but stamens 6, tetradynamous; petals 4; ovary usually divided by a false septum.

12. VIOLALES Lindl. (emend.).

39. Violaceae.

40. Resedaceae.

Hypogynous to perigynous; ♀ rarely ♂; petals present; syncarpous with parietal placentation; stamens several to few; endosperm present or absent; embryo straight or curved;—flowers mostly zygomorphic.

13. POLYGALALES (Engl. subord.).

41. Polygalaceae.

42. Vochysiaceae.

43. Trigoniaceae.

More or less as in preceding, but axile or apical placentation; stamens 8 or less with some infertility and cohesion.

14. SAXIFRAGALES Lindl. (emend.).

44. Crassulaceae.

45. Cephalotaceae.

46. Saxifragaceae (sensu stricto).

Herbaceous groups closely connected with the *Ranales* (sensu stricto) but slightly more advanced; several small groups given off showing very special leaf morphology and habitat.

15. SARRACENIALES Engler.

47. Droseraceae.

48. Sarraceniaceae.

More or less perigynous to rarely epigynous; ♀; cyclic; apocarpous to syncarpous with axile placentation; stamens definite, free; endosperm copious; embryo small, straight.

More or less as in *Saxifragales*, but plants mostly insectivorous; syncarpous; placentation parietal to axile; stamens numerous to few.

16. PODOSTEMONALES Lindl.

(Podostemales).

49. Podostemonaceae.
50. Hydrostachyaceae.

Possibly very much reduced apetalous types of *Sacifragales*, with peculiar habit, but position altogether problematical.

17. CARYOPHYLLALES (Engl. subord.).

51. Elatinaceae.
52. Caryophyllaceae.
53. Molluginaceae.
54. Ficoidaceae (Aizoaceae).
55. Portulacaceae.

Hypogynous to perigynous; ♂; cyclic; syncarpous; axile to free central placentation; stamens mostly definite; endosperm copious; embryo curved.

A prolific herbaceous group which has given rise to apetalous hypogynous groups such as *Polygonales*, *Chenopodiales*, perigynous petaliferous groups as *Lythrales*, perigynous apetalous groups as *Thymelales* and part of *Metachlamydeae* (*Gamopetalae*).

18. POLYGONALES Lindl.

56. Polygonaceae.
57. Illecebraceae.

More or less as in *Caryophyllales* but apetalous; ovary 1-celled, 1-ovuled; embryo straight to curved; endosperm copious; stipules often sheathing, intrapetiolar, membranous or scarious.

19. CHENOPODIALES Lindl.

58. Phytolacaceae.
59. Cynocrambaceae.
60. Chenopodiaceae.
61. Batidaceae.
62. Amarantaceae.
63. Basellaceae.

As in *Polygonales*, but stipules absent or very small; carpels numerous to solitary; free or connate; embryo curved.

Reduced degraded types of *Caryophyllales*.

20. GERANIALES Lindl.

Here regarded as advanced more or less fixed types from *Caryophyllales*; considerable gap between the two groups, but affinity evident through *Limnanthaceae* especially.

- 64. Linaceae (sensu stricto).
- 65. Zygophyllaceae.
- 66. Geraniaceae (emend.).
- 67. Limnanthaceae.
- 68. Oxalidaceae.
- 69. Tropaeolaceae.
- 70. Balsaminaceae.

Hypogynous; ♂; ovary entire to lobed, syncarpous; ovules mostly 1-2 in each cell; stamens definite; disk glands often present; leaves frequently much divided, stipulate; higher types have zygomorphic flowers and tendency to syngenesious anthers.

21. LYTHRALES (Onagrales Lindl. pro parte).

- 71. Lythraceae.
- 72. Sonneratiaceae.
- 73. Punicaceae.
- 74. Oliniaceae.
- 75. Onagraceae (Oenotheraceae).
- 76. Haloragaceae (Hippuridaceae).
- 77. Callitrichaceae.

Actinomorphic; perigynous to epigynous; calyx tubular, valvate; petals present; stamens as many or twice as many as petals; ovules numerous to solitary; placentation axile; no endosperm.

22. THYMELALES (Engl. subord.).

- 78. Geissolomataceae.
- 79. Thymelaeaceae.
- 80. Penaeaceae.
- 81. Nyctaginaceae.

More or less as in *Lythrales* but apetalous, often monocarpellary; ovules few to solitary; flowers often capitate; endosperm present or absent; calyx imbricate or valvate.

Herbaceous becoming woody; probably advanced type of *Caryophyllales* through subfamily *Sileneae*.

Increasingly woody apetalous relations of *Lythrales*.

23. PROTEALES Lindl.

{ 82. Proteaceae.

Origin problematical, but probably allied to *Thymelaeaceae*.

Perigynous; actinomorphic or zygomorphic; calyx valvate, often split down one side; stamens equal and opposite the sepals; ovary superior, 1-celled; no endosperm.

24. DILLELIALES.

{ 83. Dilleniaceae.

Woody to herbaceous somewhat basal group rather remotely allied to the *Magnoliales* and perhaps indicating the origin of the *Pittosporales*, *Bixales*, *Theales*, *Guttiferales* and woody *Rosales*.

84. Crossosomataceae.

Hypogynous; ♂; apocarpous; petaliferous; stamens ∞, rarely definite, free; endosperm copious, plain; embryo minute to fairly large; seeds often arillate; leaves alternate, with strong pinnate nervation.

25. CORIARIALES Lindl.

{ 85. Coriariaceae.

Rather doubtfully placed here.

More or less as above, but stamens 10 with large anthers, seeds with thin endosperm, not arillate, and leaves opposite or verticillate.

26. PITTIOSPORALES Lindl. (emend.).

{ 86. Pittosporaceae.

Might be equally well placed after *Cunoniales*.

87. Tremandraceae.

Hypogynous; ♂ rarely ♂ ♀; syncarpous with parietal to axile placentation; stamens definite, free; petals imbricate to induplicate-valvate; endosperm copious; embryo minute.

27. BIXALES Lindl.

Woody to rarely subherbaceous group in which syncarpy with parietal placentation has remained a fixed character; probably the *Passiflorales* and its allies, *Theales*, *Guttiferales*, and *Tiliaceae* find their origin by way of this group.

Hypogynous to perigynous; ♂ to ♂ ♀; syncarpous with parietal placentation; increasing unisexuality of flowers and some perigyny; stamens numerous to few; seeds with copious endosperm and small embryo.

28. TAMARICALES (Engl. subord.).

- 88. Bixaceae.
- 89. Cochlospermaceae.
- 90. Flacourtiaceae.
- 91. Samydeaceae.
- 92. Canellaceae (Winteranaceae).
- 93. Cistaceae.

Hypogynous; ♂; syncarpous, with parietal placentation; tendency to catkin-like inflorescences, small flowers; petals free to connate; stamens mostly definite; seeds often hairy, endosperm present or absent.

29. PASSIFLORALES Lindl. (emend.).

- 94. Frankeniaceae.
- 95. Tamaricaceae.
- 96. Fouquieriaceae.

More or less as in *Bixales* but no endosperm and corona often present; fruit often stipitate; habit mostly climbing and more herbaceous.

30. CUCURBITALES Lindl. (emend.).

- 97. Malesherbiaceae.
- 98. Passifloraceae.
- 99. Achariaceae.

Mostly climbing types related to the *Bixales* and becoming herbaceous; probably some of these also derived from the Papaverian groups.

Undoubtedly closely related to *Passifloraceae*, and better placed here than in the *Metachlamydeae* to which Engler assigned them, but wherein they have probably no real relations.

Constantly unisexual; ovary inferior with parietal placentation; endosperm scanty or often absent.

31. CACTALES Lindl. (emend.).

Position rather a problem, but perhaps best placed here; some grounds also for placing next to *Ficoidaceae*.

104. Cactaceae.

Succulent or woody; sepals, petals and stamens mostly numerous and in several series on a tubular axis; ovary inferior, 1-celled with parietal placentas.

32. THEALES Lindl.

105. Theaceae (Ternstroemiaceae)
(incl. Pentaphyllacaceae).

106. Marcgraviaceae.

107. Caryocaraceae.

108. Actinidiaceae.

109. Saurauaceae.

110. Ochnaceae.

111. Ancistro ladaeae.

112. Dipterocarpaceae.

113. Chlaenaceae.

Hypogynous to rarely subperigynous; mostly ♂; syncarpous with axile placentation; stamens ∞, often in several series, free or shortly connate; seeds with scanty or no endosperm; embryo large, straight or curved, rarely spiral; leaves alternate; fruits becoming winged and 1-seeded.

33. MYRTALES (Engl. subord.).

114. Myrtaceae.

115. Melastomaceae.

116. Combretaceae.

117. Rhizophoraceae.

Probably epigynous representatives of the *Theales*.

Mostly quite perigynous representatives of preceding group; mostly gland-dotted leaves; often specialized stamens and characteristic habitats; calyx becoming valvate.

34. GUTTIFERALES Lindl.

Related to *Theales* and showing the same tendency as in the *Malvales*, *i.e.*, stamens gathered into bundles.

Advanced hypogynous types of the *Theales* with opposite leaves often gland-dotted or lined; stamens uniting into bundles (phalanges); no endosperm; sepals always imbricate.

- 118. Hypericaceae.
- 119. Eucryphiaceae.
- 120. Qnünaceae.
- 121. Guttiferae.

35. TILIALES Hutch.

(Malvales auct. pro parte.)

A fairly advanced group whence considerable evolution is evident, *i.e.*, to *Celastrales*, *Rhamnales* (petaliferous, disciform types) and the bulk of *Euphorbiaceae* (apetalous types). *Tiliales* show affinities backward with *Dilleniales* and *Bixiales*.

Hypogynous, actinomorphic; ♂ or ♂ ♀; cyclic; syncarpous with axile placentation; stamens ∞ rarely few and opposite the petals, free to partially united; anthers 2-celled; endosperm copious, rarely 0, embryo fairly large, straight or curved; calyx mostly valvate; leaves alternate, stipulate; indumentum often stellate.—Trees or shrubs.

- 122. Scytopetalaceae.
- 123. Tiliaceae
- (Elaeocarpaceae).
- 124. Gonystilaceae.
- 125. Sterculiaceae.
- 126. Bombacaceae.

36. MALVALES Lindl. (emend.).

127. Malvaceae.

A very natural group representing a fixed type of the *Tiliales*, and whence little or no further evolution has proceeded.

Mostly as above but mainly herbaceous or softly woody; calyx always valvate; anthers 1-celled.

37. MALPIGHIALES (Engl. subord.).

- 128. Malpighiaceae.
- 129. Humiriaceae.
- 130. Erythroxylaceae.

Advanced and specialized groups from the *Tiliales*, with special types of indumentum, fruits, etc.

Hypogynous; actinomorphic to subzygomorphic; ♀; syncarpous with subapical placentation; ovules few; stamens usually definite; endosperm mostly absent.—Often climbers with opposite leaves.

38. EUPHORBIALES Lindl.

A composite family probably derived from several sources such as *Biales*, *Tiliales*, *Malcales*, *Celastrales* and perhaps *Sapindales*.

Hypogynous; ♂♂; actinomorphic; petals usually absent; syncarpous with 1-2 ovules pendulous from inner angle; stamens various; endosperm mostly copious.

39. CUNONIALES (Grossales Lindl. pro parte).

132. Cunoniaceae.
133. Brunelliaceae.
134. Escalloniaceae.
135. Grossulariaceae.
136. Hydrangeaceae.

Perigynous to epigynous; cyclic, mostly ♂; apocarpous to syncarpous, with central or parietal placentation; endosperm copious, embryo mostly small; leaves simple or compound.

40. ROSALES Lindl. (emend.).

137. Rosaceae.
138. Chailletiacae
(Dichapetalaceae).
139. Calycanthaceae.

As above but without endosperm; rarely acyclic; embryo large.

41. LEGUMINOSAE.

140. Mimosaceae.
141. Caesalpinaceae.
142. Papilionaceae.

Progressive Rosalean group with increasing zygomorphy of the flower; free to monadelphous or diadelphous stamens; carpel solitary; no endosperm; embryo large.

Woody to herbaceous (rare) groups allied to the early *Dillenioides* phylum and *Celastrales* and showing prolific evolution; origin through *Rosales* of the *Hamamelidales* and the so-called "*Amentiferae*."

Prolific and highly successful group derived from the *Rosales* through the *Mimosaceae* and *Caesalpinaceae* and ending in the very natural family *Papilionaceae*.

42. HAMAMELIDALES Brongn. (*Hamamelineae*).

- 143. *Bruniaceae*.
- 144. *Stachyuraceae*.
- 145. *Hamamelidaceae*.
- 146. *Eucommiaceae*.
- 147. *Myrothamnaceae*.
- 148. *Buxaceae*.
- 149. *Platanaceae*.

Closely allied to the *Rosales* with increasing reduction and unisexuality and specialization of the inflorescence leading up to the "*Ameniferae*."

43. SALICALES Lindl.

- 150. *Salicaceae*.

Probably *Salicaceae* finds its true affinity here and not with *Tamaricaceae* or *Flacourtiaceae* as has often been suggested. Resemblance to these two families probably due to parallelism.

44. GARRYALES Lindl.

- 151. *Garryaceae*.

45. LEITNERIALES Engl.

- 152. *Leitneriaceae*.

More or less as in *Rosales* but the flowers often crowded into heads or catkins; increased unisexuality; ovary often bicarpellary; tendency to apetaly; leaves alternate, mostly stipulate.

As above but flowers always in catkins and wind-pollinated; placentation parietal; no endosperm; leaves alternate, mostly stipulate.

Dieocious; flowers in catkins; ovary inferior; syncarpous, bicarpellary, 1-celled with apical placentation; endosperm copious; embryo minute; leaves opposite; no stipules.

As above but catkins erect; perianth 0 or rudimentary; ovary superior, 1-celled; placenta parietal; endosperm thin; embryo large; leaves alternate; no stipules.

Reductions from the
through *Hamamelidales*.

46. MYRICALES Engl.

153. Myricaceae.

} More or less as in preceding, but leaves aromatic and gland-dotted; placenta basal.

47. BALANOPSIDALES Engl.

154. Balanopsidaceae.

} Resembling the preceding but with two parietal placentas.

48. FAGALES Engl.

155. Betulaceae.

156. Fagaceae (Cupuliferae).

} Perianth small or absent; ovary inferior or nude, 2-6-celled; cells 1-2-ovuled; endosperm absent; flowers in catkins or spikes, ♂ ♀.

49. CASUARINALES Lindl.

(Casuarales).

157. Casuarinaceae.

} ♂ ♀; male flowers spicate, female capitate; no perianth; male with one stamen; seed solitary; no endosperm; leaves completely reduced.

Here regarded as an extreme reduction of the "*Amentiferae*", adapted to dry climatic conditions.

50. URTICALES Lindl.

158. Ulmaceae.

158a. Barbeyaceae.

159. Moraceae.

160. Urticaceae.

161. Cannabinaceae.

} ♂ or more usually ♂ ♀; ovary rarely 2-celled; ovule solitary, erect or pendulous; endosperm present or absent; leaves stipulate.

Probably a mixed degraded group derived from several of the preceding groups; *Urticaceae* proper almost entirely herbaceous.

51. CELASTRALES Benth. and Hook. f.

- 162. Ilicaceae (Aquifoliaceae).
- 163. Empetraceae.
- 164. Celastraceae.
- 165. Corynocarpaceae.
- 166. Cyrillaceae.
- 167. Cheeraceae.
- 168. Pandaceae.
- 169. Hippocrateaceae.
- 170. Icacinaceae.
- 171. Salvadoraceae.
- 172. Stackhousiaceae.

Perhaps discoid types descended from the *Tiliaceae* and *Theales*; considerable affinity with *Escalloniaceae*.

More or less perigynous; disk present, adnate to the base of the calyx tube or lining it; stamens definite, alternate with the petals; petals mostly imbricate; ovules 1-2, erect; placentas mostly axile; endosperm present; leaves simple, without glands.

52. OLACALES.

- 173. Olacaceae.
- 174. Opiliaceae.
- 175. Octoknemataceae.

More advanced types of the preceding group.

As above but petals mostly valvate; ovules pendulous.

53. SANTALALES Lindl. (emend.).

- 176. Santalaceae.
- 177. Myzodendraceae.
- 178. Loranthaceae.
- 179. Balanophoraceae.

Mostly parasitic representatives of the preceding groups, some of rather doubtful affinity.

Epigynous; calyx valvate or open; stamens opposite to the corolla-lobes when latter present; endosperm mostly present; embryo straight.

54. RHAMNALES Lindl.

- 180. Rhamnaceae.
- 181. Elaeagnaceae.
- 182. Heteropyxidaceae.
- 183. Ampelidaceae (Vitaceae).

Closely allied to the *Celastrales*.

More or less as in *Celastrales* but often of climbing habit, and the stamens always opposite the petals; leaves simple to compound; petals imbricate or valvate; endosperm scanty or ruminant.

Hypogynous to slightly perigynous; ♀ or ♂ ♀; apocarpous to syncarpous with axile basal or apical placentation; ovules mostly few; stamens definite, free; petals contorted to valvate; disk mostly conspicuous; leaves oftengland-dotted; endosperm present or absent.

More or less as in preceding group but leaves usually not gland-dotted and stamens connate into a tube.

Often zygomorphic and ♂ ♀; petals mostly present; stamens more or less perigynous; ovules 1-2 in each ovary cell; endosperm mostly 0; embryo curved or crumpled.— Trees or shrubs.

Flowers in catkins; apetalous; ♂ ♀; ovary inferior, 1-celled; ovule solitary; no endosperm.

Woody to herbaceous; constant and complete epigyny; syncarpous; stamens definite; great specialization of inflorescence with reduction of flowers. Leaves simple or compound.

55. RUTALES Lindl. (emend.).

184. Rutaceae.

185. Simarubaceae.

186. Burseraceae.

56. MELIALES Lindl. (emend.).

187. Meliaceae.

57. SAPINDALES Lindl. (emend.).

188. Sapindaceae

(Hippocastanaceae).

189. Aceraceae.

190. Sabiaceae.

191. Melianthaceae.

192. Staphyleaceae.

193. Anacardiaceae.

194. Connaraceae.

58. JUGLANDALES Engler.

195. Juglandaceae.

196. Julianiaceae.

59. UMBELLIFLORAE Bartl.

197. Cornaceae.

198. Alangiaceae.

199. Nyssaceae.

200. Araliaceae.

201. Umbelliferae.

A large mainly tropical subphylum often spoken of as the "*Pinnatae*", characterized by mostly pinnately or rarely palmately compound leaves; origin and early affinities not very evident; *Sapindaceae* and *Anacardiaceae* especially related to some *Euphorbiaceae*.

Probably partly derived from the *Celastrales*, *Rhamnales* and *Hameliales* groups, but origin or origins doubtful.

XIV.—DEVELOPMENT OF SHORT SHOOTS ON *PINUS SYLVESTRIS*.

K. W. BRAID.

Although on the continent reference has frequently been made to the development of the short shoot of *Pinus sylvestris*, little mention of it has appeared in this country. In 1899 Dr. A. W. Borthwick* called attention to the growth of the interfoliar buds in Pines and pointed out that they developed under the stimulus of an increased supply of nutriment. The short shoot could develop in two ways. When all the leaves were eaten away by insects, etc., the dormant bud could produce rosette shoots to take their place, or when an augmentation of nutriment occurred then a branch of unlimited growth might be formed.



Our illustration depicts short shoots developing on a specimen collected recently at Oxshott, Surrey. It was from quite a young plant which, however, had suffered considerably near ground level by rabbit attacks and had lost its terminal shoots as the result of the ravages of *Myelophilus piniperda* L.—the pine-shoot beetle.

* Trans. & Proc. Bot. Soc. Edin. xxi, 154 (1899).

XV.—THE FORMATION OF A SEED COLLECTION.

The difficulty of using the herbarium collections for the purposes of naming and reporting on samples of seed submitted for identification and unaccompanied by any other part of the plant, has been more and more appreciated as the number of samples submitted has increased. At the present time a considerable number of packets of fruits and seeds are received at Kew annually for determination apart from those accompanying dried material of flowers, leaves, etc. A carpological collection, consisting essentially of large fruits corresponding to material in the herbarium, has been in existence for some time, but until recently there was not at Kew any separate and comprehensive collection of small fruits and seeds.

Systematists are increasingly realising the great taxonomic value of fruits and seeds, and the work of the late Mr. Clement Reid and of Mrs. Reid on Tertiary fossil fruits and seeds has indicated yet another direction in which a seed collection may render useful and easily accessible assistance.

The formation of the present Herbarium collection has been effected by amalgamating samples of seeds and fruits already in the various departments at Kew and also by the generosity of many private individuals and firms. The following are the particulars of the principal collections now amalgamated :

From the Museums and Gardens at Kew	- - -	1810 samples.
Mr. W. B. Turrill	- - - - -	1259 "
Messrs. Carter's (mainly commonly cultivated plants)	- - - - -	584 "
Mr. F. Escombe—a valuable set of British fruits and seeds from the neighbourhood of Winchester	- - - - -	524 "
Mr. W. Dallimore (mostly collected in the Gardens)	- - - - -	496 "
The late Mr. Clement Reid (chiefly British)	- - - - -	210 "
The Misses Harley, Beedings, Sussex, from the collection of the late Dr. Harley	- - - - -	200 "
Mr. T. A. Sprague	- - - - -	50 "
Mr. C. E. Hubbard	- - - - -	40 "
Messrs. Bibby & Sons	- - - - -	27 "
By exchange (approx.)	- - - - -	100 "

The collection, which is particularly rich in British species and in species cultivated in gardens in Britain, now comprises 5300 samples, representing 3800 species in addition to varieties.

Whilst it is proposed to make this collection comprehensive and add examples of all kinds of seeds as they may be obtained, special attention will be paid to fruits and seeds of plants likely to occur in gardens or as weeds in crops in this country, and with a view to building up this collection further a number of duplicate samples are available for exchange purposes.

It is hoped that by drawing attention to the existence of this collection research workers will be stimulated to undertake the study of fruits and seeds, a subject hitherto greatly neglected and one which, from many points of view, provides a wide field for research in which many valuable and strikingly new results may be expected.

W. B. T.

XVI.—A REVISION OF EMILIA.

S. GARABEDIAN.

The genus *Emilia* (*Compositae*) was founded by Cassini ⁽¹⁾ in 1817. He described it as differing substantially from *Cacalia*, a Linnean ⁽²⁾ genus since included for the most part in *Senecio*, with about three species in *Emilia*.

De Candolle ⁽³⁾ in 1837 enumerated 13 species and referred the two species described by Cassini, *E. purpurea* and *E. flammea*, to *E. sonchifolia* and *E. sagittata* respectively. In the present revision the number of species has risen to 23.

Generic Characters. Capitula many-flowered, homogamous, not rayed; flowers tubular, 5-lobed, elongate; receptacle naked; involucre 1-seriate, ecalyculate; style-branches ending in hispid, short, obtuse or acute cones; achenes hairy or glabrous, strongly or faintly ribbed.

Affinities. This genus has affinities with *Gynura* and *Senecio*. From these it is separated by very slender characters, and one may regard it more as an association of allied species than as a distinct genus. The absence of an external row of bracts to the involucre is a feature which serves to separate *Emilia* from *Gynura*, but links it with one or two species of *Senecio*. The style-branches end as a rule in hispid, short, obtuse or acute cones, but in at least two cases they resemble those of *Gynura* wherein the style-branches have subulate appendages.

Distribution. The genus is not a large one, but certain of the species have become widely spread as weeds, while others are restricted to small areas. The species *E. sonchifolia* and *E. sagittata* are found in Tropical Africa, China, India, Malaya and America; *E. adscendens*, *E. citrina*, *E. graminea* and *E. amplexicaulis* are limited to Madagascar; *E. Walkeri*, *E. zeylanica*, *E. scabra* and *E. ramulosa* to India; *E. angustifolia*, *E. pinnatifida*, *E. javanica* and *E. marivelensis* to Malaya.

KEY TO THE SPECIES.

*Achenes glabrous :

Flower-heads solitary on very long peduncles, leafy only towards the base; leaves small, sessile, oblong-lanceolate, about 1.8 cm. long, strigillose-pubescent below; involucre bracts nearly equalling the flowers - - - - -

1. *basifolia*.

Flower-heads more or less corymbose and shortly pedunculate :

(¹) Bull. Soc. Philom. (April) 1817 : 68, and in Dict. Sci. Nat. 14 : 405 (1819).

(²) Linn. Sp. Pl. ed. i. 285 (1753).

(³) DC. Prodr. 6 : 301.

Leaves auriculate at the base :

Flowers few (about 10) in each head ; leaves ovate-lanceolate ; involucre bracts about 6 ; Tropical Africa - -

2. *protracta*.

Flowers numerous in each head :

Leaves linear-lanceolate ; involucre bracts about 10 equalling the flowers. East Asia - - - -

3. *prenanthoidea*.

Leaves lanceolate to ovate-lanceolate ; bracts $\frac{1}{2}$ to $\frac{3}{4}$ as long as the flowers. Tropical Africa - - - -

4. *Macaulayae*.

Leaves not auriculate at the base :

Leaves lanceolate, about 1 cm. wide, entire or undulate on the margin ; heads campanulate :

Involucre bracts about $\frac{1}{2}$ the length of the flowers - -

5. *caespitosa*.

Involucre bracts nearly as long as the flowers - -

6. *angustifolia*.

Leaves linear, rarely more than 5 mm. wide ; heads tubular :

Stems partially decumbent ; flower heads very few with fairly strong peduncles. Madagascar - - - -

7. *adscendens*.

Stems erect ; flower heads numerous with slender filiform peduncles. Tropical Africa - - - -

8. *integrifolia*.

**Achenes hairy or papillose on the main ribs only or all over :

†Achenes hairy only on the main ribs :

Cauline leaves much narrowed and not auriculate at the base or petiolate, more or less linear ; heads small, few, usually well under 1 cm. long :

Leaves all linear :

Heads 2-3 together. Madagascar - - - -

9. *graminea*.

Heads solitary. Uganda - -

10. *debilis*.

Leaves of two kinds, the lower lanceolate and toothed - -

11. *crepidioides*.

Cauline leaves auriculate at the base :

Basal leaves more or less pinatifid or partite :

Involucral bracts from $\frac{1}{2}$ – $\frac{3}{4}$ as long as the flowers :

Cauline leaves pinnately lobed. Philippines - - 12. *pinnatifida*.

Cauline leaves merely toothed or somewhat lyrate. Madras - - 13. *scabra*.

Involucral bracts about equal to the flowers - - - 14. *sonchifolia*.

Basal leaves not lobed or partite :

Leaves pandurate with broadly winged lower portion and large auricles, the upper part ovate and slightly hastate, slightly undulate ; flower heads about 6, campanulate ; involucral bracts $\frac{1}{2}$ – $\frac{3}{4}$ as long as the flowers - 15. *Walkeri*.

Leaves not pandurate or, if occasionally so, then narrowed in the lower portion and only slightly auriculate :

Involucral bracts about equal to the flowers :

Heads corymbose :

Involucral bracts about 0.5 cm. long ; flower heads rather small ; leaves distinctly toothed - - 16. *citrina*.

Involucral bracts about 1.2 cm. long ; flower heads larger ; leaves obscurely toothed. Malaya - 17. *javanica*.

Heads solitary, lower leaves orbicular - - 18. *marivelensis*.

Involucral bracts about $\frac{1}{2}$ as long as the flowers :

Stem leaves more or less ovate :

Heads corymbose - 19. *sagittata*.

Heads solitary or sub-solitary :

Leaves linear-lanceolate, not amplexicaul at the base, distinctly toothed. Angola - 20. *albocostata*.

Leaves ovate or oblong, markedly am-

plexicaul at the base.

Madagascar - 21. *amplexicaulis*.

Stem leaves linear or
linear-lanceolate; flower
heads few; involucrel
bracts about $\frac{1}{2}$ as long
as the flowers. S. India

22. *zeylanica*.

††Achenes densely hairy all over; leaves
entire with recurved margins, setulose-
pubescent below; heads solitary on long
nude peduncles. India - - -

23. *ramulosa*.

1. *E. basifolia* Baker in Kew Bull. 1898: 154.

TROPICAL AFRICA. Nyasaland: Zomba, *Whyte*! (type).

2. *E. protracta* S. Moore in Journ. Bot. 1905: 48.

TROPICAL AFRICA. Rhodesia: Victoria Falls, in and on
margin of rain forest, 940 m., *Eyles* 119 (type)! *Allen* 15!
Livingstone, *Rogers* 7136! Sesheke distr., *Gairdner* 502!

3. *E. prenanthoidea* DC. Prodr. 6: 303; Clarke Comp. Ind.
176; Hook. f. Fl. Brit. Ind. 3: 336; Robinson in Philipp.
Journ. Sci. 3: 217.

CHINA. Yunnan: Mengtze, *Henry* 9420! Yunnanfu,
Henry 201! Chekiang, *Hickin*!

INDIA. Sikkim: Himalaya, alt. 620 m., *J. D. Hooker*!
Khasia Mts., alt. 620-1240 m., *Hooker & Thomson*! Burma:
Myitkina distr., *Lace* 5556! Kabu valley, *Watt* 6630!
Anamallago, *Beddome* 4553! Bengal, *Clarke* 26770!

PHILIPPINES. Luzon: Baguio, Province of Benguet,
Williams 1430! Mindanao: Mt. Malindang, Province of
Misamis, *Mearns & Hutchinson*, For. Bur. 4615; Lake Lanao,
Camp Keithley, *Mrs. Clemens* 140.

4. *Emilia Macaulayae* Garab. sp. nov.

Herba suffruticosa, erecta, ramosa, glabra. *Folia* basalia
conferta, 5-6 cm. longa, 1.5-2.3 cm. lata, caulina alterna,
sessilia, lanceolata ad ovato-lanceolata apice acuta, basi amplexi-
caulia, marginibus distante denticulata. *Capitula* corymbosa,
circiter 3-nata, campanulata, multiflora; pedunculi satis
robusti, 6-7 cm. longi. *Involucri* bractee 10-15, puberulae,
1 mm. latae, acutae, quam flores aurantiaci $\frac{1}{2}$ - $\frac{1}{4}$ breviores.
Flores tubulosi, 1.3-2 cm. longi; corolla membranacea, 5-ioba;
antherae apice breviter appendiculatae; styli rami longi,
breviter exserti, in appendicem subulatam terminati. *Achaenia*
usque ad 2 mm. longa, glabra.

TROPICAL AFRICA. N. Rhodesia: Near Mumbwa 15° S.,
28° E., *Macaulay* 659! (type). N.W. Rhodesia: Broken Hill,
1300 m., *Rogers* 8050!

5. *E. caespitosa* Oliv. in Trans. Linn. Soc. 29: 10 (1873);
Fl. Trop. Afr. 3: 406.

TROPICAL AFRICA. Tanganyika Territory: Karagwe,
Speke & Grant 464! (type): "Nyika country," *Wakefield* 12!

6. **E. angustifolia** DC. Prodr. 6 : 303 (1837).
Cacalia angustifolia Wall. Cat. 3163, 3164.
 SIAM. Chiangmai, *Kerr* 1118! *Hosseus* 269! 489!
 INDIA. Pombara, *Chute* 5801!
7. **E. adscendens** DC. Prodr. 6 : 303 (1837).
Sonchus adscendens Bojer ex DC. l.c.
 MADAGASCAR. Mt. Tananarivo, *Bojer*! *Baron* 833! *Scott Elliot* 1750!
8. **E. integrifolia** Baker in Kew Bull. 1895 : 69.
 TROPICAL AFRICA. Kenya Colony : Londiani, 2,800 m., *Battiscombe* 510! Uganda : Elgon distr., *Sir Evan James*! *Dummer* 1009! Nandi Plateau, *Sir Harry Johnston*! Masai country, Lykipia, *J. Thomson*! Ruwenzori, *Scott Elliot* 6864! Ankole, *Dawe* 396! Usain Gishu Plateau and Trans Nzoia, *Dowson* 686! Eldama ravine, *Whyte*! N. Nyasaland : Fwambo, 1700 m., *A. Carson* 102! Lower Plateau north of Lake Nyasa, *J. Thomson*!
 SOUTH WEST AFRICA. Okanakasewa, *Dinter* 882!
9. **E. graminea** DC. Prodr. 6 : 303 (1837).
Sonchus gramineus Bojer ex DC. l.c.
 MADAGASCAR. Mt. Tananarivo, *Bojer*! (type); Ambohimitombo, *Forsyth Major* 269! 615! *Baron* 1739!
10. **E. debilis** S. Moore in Journ. Linn. Soc. 37 : 172 (1905).
 TROPICAL AFRICA. Uganda : Ruchigga; *Bagshawe* 444!
11. **Emilia crepidioides** Garab. sp. nov.
Herba parva, debilis, decumbens. *Folia* inferiora conferta, lanceolata, dentata, 1.5–3 cm. longa, infra glauca, superiora linearia marginibus undulatis. *Capitula* graciliter longe pedunculata, solitaria vel subsolitaria, minima, vix 0.5 cm. longa, pauciflora, cylindrica. *Involucri* bracteae circiter 5, glabrae, latae, quam flores roseas circiter $\frac{1}{4}$ breviores. *Flores* tubulosi; antherae apice exappendiculatae; styli rami breves, appendice conico-terminali. *Achaenia* 5-costata, in costis pubescentia.
 CENTRAL MADAGASCAR. Ampasiri-Baihe, near Antananarivo, *Hildebrandt* 2463! (type).
12. **E. pinnatifida** Merrill in Philipp. Journ. Sci. i : Suppl. 243 (1906).
 PHILIPPINE ISLANDS. Luzon : Bugias, Province of Benguet, *Merrill* 4265! 4664! *Elmer* 6599! 6606.
13. **E. scabra** DC. Prodr. 6 : 304; Wight Ic. t. 1123; Gamble Fl. Madras 4 : 716.
E. sonchifolia var. *scabra* Hook. f. Fl. Brit. Ind. 3 : 336.
 INDIA : Anamallago, *Beddome* 4550! Nilghiri, *Hooker & Thomson*! Gundattu Shola, Pulneys, *Bourne* 2704!
14. **E. sonchifolia** DC. Prodr. 6 : 302; DC. in Wight Contrib. 24; Miq. Fl. Ind. Bat. 2 : 101; Kurz in Journ. As. Soc. 1877, pt. 2 : 194; Oliver Fl. Trop. Afr. 3 : 405; F. Vil. Nov. App. 120; Naves in Fl. Filip. ed. 3 : t. 282; Hook. Fl. Brit. Ind. 3 : 336; Mart. in Nuov. Giorn. Bot. Ital. 15 : 300; Vid.

Phan. Cuming. Filip. 122 ; Rev. Pl. Vas. Filip. 164 ; Forbes & Hemsl. in Journ. Linn. Soc. Bot. 23 : 449 ; Merr. Govt. Lab. Publ. 27 : 56 ; Hayata in Journ. Coll. Sci. Tokyo, 18 : Art. 8. 26 ; King & Gamble Mat. Fl. Malay Penin. 16 : 38 ; Gamble Fl. Madras 4 : 716.

Cacalia sonchifolia Linn. Sp. Pl. 835 (1753). *E. purpurea* Cass. Dict. 34 : 393. *E. rigidula* DC. Prodr. 6 : 302.

DISTRIBUTION : Warm parts of Africa and Asia, Japan, and introduced in America.

CHINA. Hong Kong, *Urquhart* ! Formosa, *Oldham* ! Hainan, *Henry* 8077 ! Hupeh, *Henry* 7595 ! Pakhoi, *Playfair* ! *Faurie* 15797 ! Foochow, *Carles* 813 ! Chekiang, *Faber* 158 ! *Hickin* ! Takow, *Henry* 2088 ! Mengtze, *Henry* 13790 ! Swatow, *Perry* ! *MacLagan* !

JAPAN. Nagasaki, *Maximowicz* !

INDO CHINA. Tonkin, *Balansa* 842 ! 3066 ! Siam ; Bangkok, *Kerr* 3768 ! Anam, *Kuntze* 3597 !

PHILIPPINES. Parang, *Loher* 3690 ! Benguet ; Data, Tonglon, *Loher* 3691 ! 3692 ! Luzon ; Manila, San Francisco del monte, *Loher* 3693 ! 3694 ! Borden, For. Bur. 2116 ! *Meyer*, For. Bur. 2175 ! *Merrill* 3944 ! 3282 ! 6668 ! *Cuming* ! Island of Mindor, *Merrill* 3318 ! Panay, *Copeland* 119 !

MALAY ARCHIPELAGO. "Indian Archipelago," *Seemann* 2343 ! Brit. N. Borneo ; Tenom, *Gibbs* 2675 ! Bangarmassing, *Motley* 708 ! Java, *Horsfield* ! Celebes, *Savinierre* ! Timor, *Riedel* !

CEYLON. Colombo, *Thwaites* 3343 !

INDIA. Madras, *Shuter* ! *Sauliere* 308 ! 385 ! *Cole* 49 ! 57 ! Simla, *Collett* 393 ! Koli near Simla, *Drummond* 1812 ! Poona, *Jacquemont* 1119 ! Bundelkhand, *Duthie* 6411 ! Agra district, *Duthie* 6419 ! Moradabad, *Hooker* ! Surinan, *Hostmann* ! *Berthoud Coulon* 2151 ! Almora, 1600 m. alt., *Strachey* & *Winterbottom* ! Sillett, *Wallich* ! Sikkim, *Hooker* ! Khasia, *Hooker* & *Thomson* ! Assam, *Craib* 154 ! Shan Hills, *Collett* 830 ! Bombay, Belgrave common, *Ritchie* ! Concan, *Law* !

TROPICAL AFRICA. Northern Nigeria : Vom, Bauchi Plateau, 1,000 m.-1,500 m. alt., *Dent - Young* 159 ! Gabon : Libreville, *Debreaux* 178 ! Angola : Huilla, in Morro de Lopollo, *Welwitsch* 3580 ! 3583 ! Port. E. Africa, Quilimane, *Kirk* ! Zambesi delta ; Mambucha and Vicente, *L. Scott* ! Nyasaland : Mt. Milanje, *Whyte* !

MAURITIUS. *Bojer* ! *Telfair* !

15. *E. Walkeri* Hook. f. Fl. Brit. Ind. 3 : 337 (1881).

E. prenanthoidea Thwaites Enum. 167, in part, not of DC.

CEYLON. Ramboddie and Newera Ellia, Central Prov., *Walker* ! *Thwaites* !

16. *E. citrina* DC. Prodr. 6 : 303 (1837).

Cacalia citrina Bojer ex DC. l.c.

MADAGASCAR. Near Tananarivo, *Bojer* ! *Gerrard* 172 !

Baron 6504 ! *Bowles* ! *Major* 49 ! 363 ! *Parker* ! *Hildebrandt* 3514 ! *Deans Cowan* ! *Forbes* !

17. *E. javanica* C. B. Robinson in Philipp. Journ. Sci. 3 : 217 (1908).

Hieracium javanicum Burm. Fl. Ind. 174, pl. 57, f. 1. (1768). *Prenanthes javanica* Willd. Sp. Pl. 3 : 1534 (1804).

PHILIPPINES. Luzon : Province of Benguet, *Williams* 1438 ! *Mearns* 2789 ; Prov. of Zambales, Mt. Tapulao, Bur. Sci. 4786 ; Ramos, Prov. of Bataan, Lamao river, *Elmer* 6668, 6999, *Merrill* 3944, *Foxworthy* 1594, *Borden* 2116, *Meyer* 2175. Mindanao : Cotabato, *Copeland*.

18. *E. marivelensis* *Elmer* Leaflets Philipp. Bot. i. 362 and 148 (1906).

TROPICAL AFRICA. Zanzibar (according to *Elmer*).

PHILIPPINES. *Marave* 74 ; Luzon ; Mt. Mariveles, Prov. of Bataan, *Merrill* 3282 (type).

19. *E. sagittata* DC. Prodr. 6 : 302 ; Oliv. Fl. Trop. Afr. 3 : 405 ; Miq. Fl. Ind. Bat. 2 : 102.

Cacalia sagittata Vahl. Symb. 3 : 91, excl. syn ; *C. sagittata* Willd. Sp. Pl. 3 : 1731 ; *C. coccinea* Curt. Bot. Mag. tab. 564. *Emilia flammea* Cass. Dict. 14 : 406, atlas 3, pl. 5. *Cacalia bicolor* Roxb. Fl. Ind. 3 : 412. *Emilia sonchifolia* Benth. in Hook. Niger Fl. 439, non DC. *Cacalia humifusa* Bojer in litt. 1835. *Emilia humifusa* DC. l. c. *Cacalia pumila* Bojer in litt. 1835 ex DC. l. c. *Emilia pumila* DC. l. c.

CHINA. Pekin, *Bretschneider* 417 !

JAPAN. Yesso, *Maries* !

INDO CHINA. Siam : Chiengmai, *Kerr* 1118 ! *Hosseus* 269 ! 489 !

INDIA. Mōradabad, *Thomson* 840 ! Concan, *Stocks* ! Madras ; Kodaikanal, *Bourne* 1113 ! 1114 ! Khasia, *Clarke* 17486 !

TROPICAL AFRICA. Sierra Leone ; near Wilberforce, *Scott Elliot* 3998 ! on the way to Lester Peak, *Scott Elliot* 3852 ! Freetown, Mt. Aureole, *Dalziel* 996 ! Liberia ; within 6 miles of Monrovia, *Sir H. Johnston* ! Gold Coast ; *Farmar* 428 ! S. Nigeria ; Agola, *Thomas* 78 ! Akwa, *Thomas* 32 ! Abbeokuta, *Irving* ! Lagos Colony, *Sir W. Macgregor* 44 ! 114 ! *Moloney* ! swampy parts of Ikoyi plains, *Dalziel* 1163 ! Niger, *Barter* ! N. Nigeria ; Lokoja distr., *Parsons* 99 ! *Dawodu* ! Abinsi, *Dalziel* 664 ! Cameroon ; Lolodorf, *Staudt* 346 ! *Preuss* 1156 ! *Braun* ! Amba Bay, *Mann* 731 ! Central Africa ; Monbuttu, near Munsu's Dorf, *Schweinfurth* 3368 ! Gabon ; Sibange Farm, Munda, *Soyaux* ! Lower Congo ; Loukouno, *Hens* 269 ! Dundusana, *Morteban* 103 ! Angola ; among mts. of Sobato de Bumba Andala, rather rare, *Welwitsch* 3575 ! 3576 ! 3577 !

3578 ! 3928 ! Golungo Alto, about Sänge, *Gossweiler* 2430 !
 3576 ! Malange distr., *Gossweiler* 1205 ! Between Chibia and
 Quihita, *Pearson* 2243 ! Road to Bembe, flowers scarlet,
Monteiro ! Chitanda, *Baum* 182 ! Nkando, 900 m., *Darve* 95 !
 Southern Abyssinia ; between Karrar and Addis Ababa, *Wellby* !
Cockburn ! Uganda ; Banda, *Dummer* 2442 ! Busoga, *Brown*
 288 ! Unyoro, *Brown* 399 ! Ankole, *Roscoe* ! Zanzibar ; *Last* !
Goodwin ! *Lyne* 16 ! *Hildebrandt* 1024 ! *Speke and Grant* !
Bojer ! *Kuntze* ! Usaramo, *Stuhlmann* ! *Hoffmann* 2025 !
 Amboni, *Kassner* 9 ! Tanganyika ; Chifumbazi, *Nicholson* !
 Fringa, *Goetze* 651 ! Uhehe, *Goetze* 685 ! *Wakefield* 12 ! Namasi,
Cameron ! Shire valley, *Kirk* ! Shire Highlands, *Adamson* !
 Mozambique, *Forbes* ! *Johnson* 220 ! Quilimane, *Scott* !
 Moramballa, *Kirk* ! Mundala, *Scott* ! Manganja Hills, *Meller* !
 Ribé, *Wakefield* ! Randinba Hills, *Stocks* ! S. Rhodesia ;
 district Manica, Umtali, *Teague* 16 ! *Cecil* ! Mazoe, *Eyles* 288 !
 Melsetter, *Swynnerton* 4188 !

NEW GUINEA. Between Owen Stanley Range and S. coast,
Rose 36 !

PHILIPPINES. Mt. Mariveles, Luzon, *Elmer* 6999 ! Baguio,
Williams 1430 ! Oahu, *Heller* 2296 !

MEXICO. Orizaba, *Saunders* 19 !

WEST INDIES : S. Vincent, *Guilding* !

COLOMBIA ; Envijado, Antioquia, *Lehmann* 7489 !

20. ***E. albocostata*** *Hiern* Cat. Welw. Afr. Pl. i. 596 (1898).

TROPICAL AFRICA. Angola : Mossamedes, *Welwitsch* 3573 !

21. ***E. amplexicaulis*** *Baker* in Journ. Linn. Soc. 20 : 190 (1883).

MADAGASCAR. *Bojer* ! *Meller* ! Baron 1603 ! Major 50 !
Bowles ! *Hildebrandt* 3233 !

22. ***E. zeylanica*** *C. B. Clarke* Comp. Ind. 175 (1876) ; Hook.
 f. Fl. Brit. Ind. 3 : 336 ; Gamble Fl. Madras 4 : 716.

E. prenanthoidea *Thwaites* Enum. 167 in part, not of DC.

CEYLON. Central Province, *Thwaites* 430 ! *Gardner* 422 !
Walker ! *Thomson* ! Kandy, *Moon* !

MADRAS : Kodaikanal, *Bourne* 1116 ! 2706 ! Kukal,
Bourne 2705 !

Var. ***paludosa*** *Gamble* Fl. Madras 4 : 716.

MADRAS : Kodaikanal, *Bourne* 690 ! 1115 ! Makklamputti
 Shola, *Bourne* 319 !

23. ***E. ramulosa*** *Gamble* in Kew Bull. 1921 : p. 120, and in Fl.
 Madras 4 : 716.

S. INDIA. Attraymallay hills : Travancore, 1580 m.,
Beddome (Herb. Madr.) ; Agastiamalai, Tinnevely, *Barber*
 2930 ! Kalivayalpil, Tinnevely, *Barber* 3053.

XVII.—CITHAREXYLUM BESSONIANUM.

T. A. SPRAGUE.

In 1878 a dried specimen of a plant cultivated in the Botanic Garden, Palermo, under the name *Citharexylum Bessonianum* Tod., was received at the Kew Herbarium from the late Professor Todaro. It was found to agree with a specimen, received in 1869 from Mr. W. W. Saunders, of a plant cultivated at Torquay, and said to be "from the Himalayas." Further material of the species was sent to Kew for identification as "an old garden plant" by the late Dr. M. T. Masters in 1895; and additional specimens were received from the Cambridge Botanic Garden in 1903, where it had been cultivated as "*Lippia japonica*", and from other sources. The species is still in cultivation at Cambridge, and is now represented in the Temperate House at Kew.

The name *Citharexylum Bessonianum*, though current in gardens in this country, and doubtless also in the Mediterranean region, does not appear to have been published. During an unsuccessful attempt to trace the publication of *C. Bessonianum*, however, it was discovered that the species had been known during the period 1863–1905 under seven other names in the genera *Ligustrum*, *Lippia* and *Citharexylum*. It was published in 1863 as a new species, *Ligustrum spicatum* Jacques (Rev. Hort. 1863, 339). Jacques stated that his nephew, M. Verdier, had obtained seeds from Messrs. Vilmorin, who had received them from Mexico. He described it as an evergreen shrub about 1 m. high, with blackish-brown bark, the old stems very rugose, the young stems smooth and very glabrous; leaves opposite, shortly petioled, ovate-lanceolate, entire or sometimes denticulate at the apex, green and glossy on the upper surface, paler beneath; "spikes" simple, terminating the lesser branches and branchlets, slender, slightly arcuate; flowers shortly pedicellate, bracts about the same length as the pedicels; calyx brownish, almost entire; corolla tube short, a little longer than the calyx, yellowish; limb pale rose-violet, hardly 4–6 mm. in diameter, composed of five rounded spreading lobes; throat fimbriate.

Jacques remarked that the five-lobed corolla and the American origin of the species suggested that it should be excluded from *Ligustrum* (*Oleaceae*); and Thuret, who had it in cultivation at Antibes, transferred it to *Lippia* (*Verbenaceae*) as *Lippia ligustrifolia** or *L. ligustrina*†. According to Dippel‡ the species appeared in Van Houtte's Catalogue for 1887 as *Citharexylum ligustrinum*. Dippel does not appear to have seen specimens, as his description is based on that of Jacques.

In 1905 Greenman published a description of a supposed new species, *Citharexylum Pringlei*, based on a plant collected by

* Decne in Fl. des Serres, sér. 2, xii. 11 (1877).

† Decne in Nouv. Arch. Mus. Par. sér. 2, ii. 38 (1879).

‡ Handb. Laubholz, i. 53 (1889).

Pringle (No. 8932) in the State of Hidalgo, Mexico. This number is represented in the Kew Herbarium, and is undoubtedly conspecific with *C. Bessonianum*. Greenman was the first to supply a good description of the species and it is, therefore, unfortunate that the name *Citharexylum Pringlei* cannot be retained. *C. Pringlei*, however, agrees so well with the description of *Ligustrum spicatum* Jacques that there can be little doubt that the two are conspecific. As Greenman remarks, "the glabrous character of the plant, with the smooth shining upper surface of the leaves, the gracefully recurved racemes and the bicolorous corollas, render this species of easy recognition, and readily separated from all known species of the genus". The presence of an occasional leaf which is dentate towards the apex is an additional diagnostic character. The species should accordingly be known as *Citharexylum spicatum* (Jacques) under International Rules. Its synonymy and geographical distribution are as follows :—

Citharexylum spicatum (Jacques) Sprague, comb. nov.
Ligustrum spicatum Jacques in Rev. Hort. 1863, 339.
Ligustrum multiflorum Hort. ex Jacques, l.c. *Ligustrum amurense* Hort. Sahut ex Decne in Fl. des Serres, sér. 2, xii. 11 (1877).
Lippia ligustrifolia G. Thuret ex Decne, l.c. *Lippia ligustrina* G. Thuret ex Decne in Nouv. Arch. Mus. Par. sér. 2, ii. 38 (1879). *Citharexylum ligustrinum* Cat. Van Houtte, 1887; Dippel, Handb. Laubholzk. i. 53 (1889). *Citharexylum Pringlei* Greenm. in Proc. Am. Acad. xli. 243 (1905). *Citharexylum Bessonianum* Tod. MSS. in Hort. Panorm. et in Herb. Kew.

MEXICO. Hidalgo: Barranca below Trinidad Iron Works, 1500 m., fl. July, *Pringle* 8932.

In its native country *C. spicatum* attains a height of 3–5 m., according to Pringle. As grown in England it is a comparatively small shrub and though in some places it can be grown in the open with the protection of a wall, as a rule it is not hardy.

XVIII.—A REVISION OF PASSERINA.

D. THODAY.

The genus *Passerina* is readily distinguishable from other S. African *Thymelaeaceae* by ericoid leaves with a groove on the upper side lined with hairs, and small wind-pollinated flowers with exserted stamens, dusty pollen and penicillate stigma. The absence of scales or other outgrowths of the receptacle and the strictly ericoid leaves distinguish it from microphyllous species of *Lachnaea*.

It is on the other hand a genus in which, owing to the small size of both leaves and flowers, the characters that distinguish the species from one another are apt to be overlooked or to have their value underestimated. Moreover the leaves and bracts are difficult to describe concisely with a terminology devised mainly for the description of flat leaves. It is hardly

surprising, therefore, that the early diagnoses were often inadequate, especially in view of the small range of material on which they were based.

Unfortunately, in his conspectus of the genus in De Candolle's *Prodromus* (xiv., pp. 561-3), where he first restricted it within the limits since recognised, Meisner seems to have depended mainly on descriptions without type specimens, although in dealing with Drège's specimens in *Linnaea* (xiv., p. 400) he had already expressed doubts as to the validity of the characters on which species had been founded. He therefore misapplied names and perpetuated much of the existing ambiguity.

My attention was drawn to the unsatisfactory classification of the genus by the failure of attempts to identify with the *Flora Capensis* forms which experience in the field had shown to be distinct. Reference to the available herbaria only served to show that others had not been more successful, and that the existing classification had been based to a large extent on relatively superficial characters.

In undertaking to remedy the confusion I started with the advantage of an acquaintance in the field with several species, one from the Tulbagh Valley and others from the Cape Peninsula. Of the latter each has its characteristic habitat, but there is just sufficient overlapping to demonstrate that they are not merely habitat forms. I have since collected most of the more important species in different parts of South Africa. I have also seen all the specimens of the genus in the various South African herbaria and I gladly take this opportunity of thanking those to whose courtesy I am indebted for the loan of specimens or for other facilities, and also those who have from time to time collected and sent me additional specimens.

The available specimens were first sorted without reference to literature or previous identifications, and then further studied and compared. Interesting confirmation of the soundness of the resulting classification was afforded by the orderly geographical distribution which revealed itself as the work proceeded.

Finally I was able, through the courtesy of Sir David Prain and Dr. Stapf, to work through the sheets in the Herbarium at Kew and also to see Thunberg's specimens kindly sent to Kew from Upsala by Dr. Juel. I am also indebted to Dr. Daydon Jackson for the opportunity of examining the specimens in the Linnean Herbarium and to Dr. Rendle for allowing me to work through those at the British Museum.

I have now, I believe, seen all the important type specimens and can therefore apply the existing names with some confidence.

REMARKS ON NOMENCLATURE. The application of the Linnean names requires some comment.

In the Linnean Herbarium there are four specimens under the name *Passerina* which come within our purview. Of these

two are named in Linné's hand¹. That named by him *P. filiformis* is one of Clifford's specimens. Linné probably had it before him when he wrote the first edition of *Species Plantarum* and it is probably this specimen which is enumerated, by the underscoring of *P. filiformis* in an interleaved copy of that work, as having been in his possession in 1753². It belongs to a form which is locally common in the Cape Peninsula, where it was probably collected. It is, however, quite distinct from the commonest Cape Peninsula species, which was better represented in the early herbaria and has been known hitherto by the same name. There is nothing in Linné's description to differentiate between the two, and I therefore take his own specimen as the type of *P. filiformis*. The other is Meisner's *P. filiformis* α *vulgaris*. It is the commonest species in the Cape Province and I propose for it the name *P. vulgaris*.

The second specimen is named by Linné *Passerina ericoides*. It proves to be Meisner's *Chymococca empetroides*. The description in *Mantissa Plantarum* fits it well. In particular "corollis globosis" and "corollae tubus globosus, inflatus" could not apply to any other species. As *Passerina rigida* has a fleshy fruit Meisner's genus *Chymococca* cannot be upheld and the name *P. ericoides* must be retained for the form to which Linné applied it.

In Thunberg's Herbarium there are three sheets named by him *Passerina glomerata* α , β and γ respectively. The first of these must be taken as his type for the species. It is the only one to which "foliis . . . truncatis" applies (*Prodromus* p. 75). The specimen was probably collected not far from the Tulbagh Valley. It does not occur in the Cape Peninsula and the locality given in Thunberg's *Flora Capensis*—"Hout Bay and elsewhere"—applies particularly to his *P. glomerata* β .

The other two sheets bear names in pencil in handwriting which I have identified as Wikström's by comparing it with signed letters in the Library at Kew. Thunberg's *P. glomerata* β is named *rigida* and his *P. glomerata* γ is named *paleacea*. Clearly these are the specimens referred to by Wikström³ as seen by him in Herb. Thunb., and I take them as the types of his two species.

The name "*divaricata*" on another sheet in the same hand identifies Wikström's *P. filiformis* var. *divaricata* with *P. falcifolia* of C. H. Wright.

Meisner⁴ did not make any new species, but gave varietal rank to the new forms he recognised. Of these some can be identified with forms here distinguished: the synonymy is given under the species.

(1) The unnamed sheets, one of which is *Sparrman* 161, are both *Passerina paleacea* Wikstr.

(2) Daydon Jackson: Index to Linn. Herb., Suppl. to Proc. Linn. Soc. London, 1912.

(3) J. E. Wikström, Kongl. Vet. Acad. Handl. 1818, pp. 322-5.

(4) DC. Prodr. loc. cit.

Of the new species given in the Flora Capensis I retain *P. falcifolia*, *P. comosa*, *P. Galpini*, and *P. rubra*.

On the other hand *P. laniflora* must be excluded as the type specimen is a *Lachnaea*. I think it advisable, in order to avoid confusion, to reject also the name *corymbosa*. Specimens of three distinct species are quoted under it: the description fits none of these well, but *P. glomerata* of Thunberg better than the others.

Of Gandoger's two species *P. eriophora* is *P. rigida* of Wikstrom. From the locality given for *P. hamulata* I judge it to be probably *P. paleacea* Wikstr. The description would not fit any other species known to occur on "sand dunes near Wynberg" (Cape Flats), but is insufficient to confirm the identification without the specimen.

When the available names are correctly applied there are several species still unnamed. I have proposed names for these. There is a small residuum of specimens of uncertain identity or representing additional forms inadequately. These are quoted with comment. I have not so far had the opportunity of working through the Continental herbaria. All the specimens quoted have been seen by me, unless otherwise stated.

I propose to deal with the interrelationships of the species and their geographical distribution elsewhere in their general bearings. The impression created is of a constellation of forms which have diverged from a common stock in relation to different habitats. These forms do not fall readily into groups of which the members could be regarded as varieties of variable species. Intermediate forms are lacking. Those species with a wide range retain their characters with little variation even when their range includes considerable differences of climate, and there is no evidence that even the rare and local forms are merely local forms in the technical sense.

The evidence is, however, by no means complete. Not only are there large parts of South Africa relatively remote or inaccessible remaining to be thoroughly explored, particularly the mountain ranges, but even in better known parts of the country the *Passerinae* must often have been passed over by collectors, partly because they were regarded as common and well known, partly because their restricted flowering season has been missed. It may be expected, therefore, that further field work will extend the known range of some species and perhaps add to the number of local species.

From the generalised impression recorded above, that each species has its own characteristic habitat, or range of environmental conditions, it is clearly desirable that future records should be accompanied by details as full as possible of the exact locality of the specimen, its situation, habitat (including geological data), and other plants growing in close association with it (especially those locally common).

Passerina Linn. Gen. Pl. 341 ; Meisn. in DC. Prodr. xiv. 561 ; *Chymococca* Meisn. l.c. 565.

Flowers hermaphrodite, 4-merous. *Receptacle* usually flask-shaped, without scales ; lower part enclosing the fruit, persistent or ultimately splitting and falling off. Hypogynous scales none. *Sepals* 4, patent, sub-equal, nearly as long as the receptacle tube ; lateral sepals enclosing the inner in the bud. *Petals* none. *Stamens* 8, exserted ; four longer opposite and sub-equal to the sepals, four shorter alternating with them, all inserted at the top of the receptacle tube ; anthers dehiscing by longitudinal slits ; pollen dusty. *Ovary* superior, sessile, ovoid, one-celled ; style slender, laterally inserted near the top of the ovary ; stigma mop-like, closing the mouth of the tube. *Ovule* solitary, anatropous, pendulous, attached near the base of the style. *Fruit* indehiscent, one-seeded, included in the persistent base of the receptacle-tube, or ultimately becoming free from it ; pericarp membranous or fleshy. *Seed* with black crustaceous testa, the micropyle forming a curved beak. Embryo straight, cotyledons fleshy, plano-convex. Endosperm fleshy, surrounding the embryo.

Ericoid shrubs ; branches slender, pubescent, tomentose or woolly when young. Leaves opposite, decussate, small and narrow, concave or closely involute, lined within with woolly hairs. Flowers small, reddish or yellowish, wind-pollinated, in the axils of bracts more or less dilated, without bractcoles, arranged in spikes, sometimes sub-capitulate, terminal or ultimately left behind by further growth of the branch.

An endemic South African genus with one species extending to Southern Rhodesia. Flowering period lasting usually not more than three or four weeks, in spring or early summer.

DESCRIPTION OF THE SPECIES. The interpretation of the descriptions and the use of the key to the species will be facilitated if the following points are kept in mind :—

1. Leaves and bracts may vary somewhat in size and form even on the same plant. Leaves on growth shoots are usually much longer than those on the short lateral twigs but not wider in proportion. Below the inflorescences the leaves are frequently more or less transitional in form, sometimes for a considerable distance. The bracts commonly vary in one and the same inflorescence, those near the base being less dilated and more like the leaves, while if the typical bracts have a leaf-like point this may be very short or almost obsolete in the uppermost ones.
2. The hairy covering of the young stem varies somewhat with habitat and season, though less than Meisner supposed. The general habit and size of the plants may also vary considerably. Plants growing in sheltered situations have laxer branches or may even assume a weeping habit.
3. The bracts are usually lined within at the tip and variably along the middle by woolly hairs like those in the leaf-

grooves, while at the base a tuft of hairs surrounds the ovary. But the lateral expanded portions of the bracts are glabrous in some species, variously hairy in others: these parts are referred to as the *wings*.

The characters of the bracts have proved of most general service in distinguishing the species. In certain cases the anatomy of the leaves has afforded valuable confirmatory evidence.

ARTIFICIAL KEY TO SPECIES.

Inflorescence terminal, subcapitulate,
with about four flowers - - - - - 1. *montana*.

Inflorescence spicate, subterminal,
usually left behind ultimately, at least
on some of the leading branches, by
further vegetative growth:

Outer sepals bearded behind the apex:

Leaves and bracts more or less hairy
on the back - - - - - 8. *comosa*.

Leaves and bracts glabrous on the
back or merely bearded at the apex:

Bracts with membranous glabrous
wings:

Leaves narrow, linear or slightly
tapering - - - - - 9. *filiformis*.

Leaves broader, linear-lanceo-
late to ovate - - - - - 11. *paludosa*.

Bracts comose within:

Bracts smooth, like the leaves
but larger - - - - - 4. *Burchellii*.

Bracts ovate, finely ribbed, apex
sub-truncate - - - - - 5. *rubra*.

Outer sepals not bearded:

Bracts with broad rounded glabrous
membranous wings - - - - - 10. *Galpini*.

Bracts hairy all over within:

Leaves mostly more than 4 mm.
long:

Leaves falcate; bracts large,
ovate-acuminate, veined; tube
long exserted - - - - - 7. *falcifolia*.

Leaves linear, rounded at the
apex; bracts little expanded,
shorter than the leaves; tube
short - - - - - 6. *obtusifolia*.

Leaves linear; bracts ovate-
acuminate, with 7-13 close
parallel folds, closely woolly
within - - - - - 12. *vulgaris*.

Leaves linear, slightly wider at the base; bracts ovate, finely ribbed, apex subtruncate, comose within and fringed with hairs - - - - 5. *rubra*.

Leaves mostly less than 4 mm. long :

Leaves truncate or hump-backed in profile at the apex; bracts obtuse, ribbed and reticulately veined - - - - 2. *glomerata*.

Leaves not truncate :

Bracts leaf-like, smooth; tube subrotund, pericarp succulent - - - - 15. *ericoides*.

Bracts broad, with short point and few shallow folds obsolescent towards the base; tube flask-shaped, pubescent; pericarp subsucculent - 14. *rigida*.

Bracts obtuse, smooth; flower small, glabrous or nearly so; tube short, not dilated below - - - - 13. *paleacea*.

Bracts rhombic, smooth on the back but lateral margins sub-membranous and veined 3. *pendula*.

1. *Passerina montana* Thod. sp. nov.; capitulis terminalibus, bracteis erectis submembranaceis coloratis distincta. — *P. ericoides* C.H. Wright in Fl. Cap. v. ii. p. 12, partly, not of Linn. *P. corymbosa* C. H. Wright ibid. p. 14, partly.

Young stems closely tomentose or pubescent. *Leaves* small and narrow, slightly diverging or appressed, ovate to linear, wider at the base, $1\frac{1}{2}$ to 4 mm. long, rarely longer on the leading branches; convex and glabrous on the back, at the apex often laterally compressed and angled. *Inflorescences* strictly terminal, capitulate, of four large bracts subtending four flowers, with or without smaller barren bracts below them, rarely with additional younger flowers below the four principal ones or only two. Axis short, woolly after fruiting. Principal bracts erect, longer than the leaves, 4–5 mm. long, rarely shorter or longer, ovate to obovate, often keeled and subacute, usually thin and coloured, longitudinally veined; comose within, glabrous on the back. *Receptacle* tube 4–5 mm. long, rarely shorter, softly hairy within; base slightly dilated, glabrous or nearly so, persistent, ultimately splitting off the fruit; neck about half as long, pubescent, circumscissile above the fruit. *Sepals* 2–3 mm. long, scantily pubescent on the upper side, glabrous below; outer concave, inner obovate or oblong.

Anthers oblong, about 1 mm. long. *Ovary* rather narrow, often hairy below the insertion of the style. *Fruit* dry.

A spreading shrub, up to 4 or 5 feet high, with numerous short leafy twigs, growing at altitudes from 3000 to 10,000 feet above sea level on the mountain ranges of the Great Escarpment from the Eastern Cape Province to Southern Rhodesia.

CAPE PROVINCE. King Williamstown Div.: Pirie, 3000 ft., *Sim* 68; Mts., 6000 ft., *Rattray* 382. Cathcart Div.: Fairford, Cathcart, *Miss D. Cotterell* 41. Queenstown Div.: Andriesberg, near Bailey, among rocks near summit, 6400–6800 ft., *Galpin* 2028. Wodehouse Div.: Indwe, 4500 ft. [Stormbergen], *Sim* 2595. Molteno Div.: Broughton near Molteno, 6300 ft., *Flanagan* 1635. Albert Div.: *Cooper* 625. Barkly East Div.: Drakensberg, summit of Doodman's Kranz Mt., 9650 ft., *Galpin* 6825; Wittebergen, *Mrs. F. W. Barber* 745. Herschel Div.: Majuba Nek near Sterkspruit, *Hepburn* 85.

BASUTOLAND. Leribe, Mtn. slopes 5–6000 ft., *Dieterlen* 49; Thabana-Morena, slope above mission station, *Dieterlen* 1247; Mequalling, *T. Cooper* 702; Mathatha, 9000 ft., *Hon. J. Bryce*; without precise locality, *E. Wager in Herb. Transvaal Mus.* 10772, *T. Cooper* 2302.

NATAL. Near Mooi River, 4–5000 ft., *J. M. Wood* 1523, 4036; Near Hoffenthal, Little Tugela Distr., 4000 ft., *J. M. Wood* 3464; van Reenen, 5500 ft., *J. M. Wood* 6601, 11405, 12179, *Bews* 42, *M. Franks in Natal Herb.* 14144; Bushmans Pass, 5–6000 ft., *J. Thode in Natal Herb.* 11418; Goodoo Pass near Mont-aux-Sources, *Sim*; Giants Castle, 10,000 ft., *R. E. Symons* 144; in Movelu Hills, 7000 ft., *Sutherland*; Klip River, 3500–4500 ft., *Sutherland*.

ORANGE FREE STATE. Harrismith, *H. J. Sankey* 69; Ladybrand, *Rogers* 2956, 788; Witzie's Hoek [Roode Bergen], *Junod in Herb. Transvaal Mus.* 17326; without precise locality, *Cooper* 842.

TRANSSVAAL. Carolina, *Moss and Rogers* 1263; Barberton, *J. Thornecroft* 917; Barberton, Kaapsche Hoop, *Rogers* 21090; Sabie, Lydenburg Div., *Rogers* 23717, 23675; The Downs, Pietersburg Distr. [Mts. W. of Leydsdorp], *Rogers* 21919.

S. RHODESIA. Odzani River Valley, Manica Distr., Umtali Div., *A. J. Teague* 312.

This species has been called by S. African field botanists fairly consistently *P. ericoides*. It is probably the one referred to under that name by *Sim* in his "Forests and Forest Flora of Cape Colony".

2. *P. glomerata* *Thunberg* Prodr. Pl. Cap. p. 75 (1794).—*P. glomerata* α *Thunberg* MS. in Herb. propr., not β or γ . *P. rigida* var. *truncata* *Meisner* (*Drège* 2971 in Herb. Kew. ex Berlin Herb.). One of *Drège's* specimens in Herb. Kew. named by *Meisner* *P. rigida* β *tetragona* is probably a young plant of this species.

Young stems shortly pubescent. *Leaves* small, 2–4 mm. long, mostly imbricate, four-ranked, slightly diverging at the apex; wider at the base, laterally compressed and keeled at the apex, truncate in profile or humped on the back. *Inflorescences* terminal or ultimately left behind by further growth on the principal branches, dense and few-flowered. *Bracts* 3–4 mm. long, ovate to broadly obovate, concave, obtuse, rather thick, truncate in profile at the apex, keeled and reticulately ribbed on the back, thickly woolly within. *Receptacle* tube about 4 mm. long, hairy within; base inflated, pubescent in the upper part, five-ribbed, at first persisting round the fruit, later splitting off; neck pubescent, exserted, constricted, bent and ultimately circumscissile above the ovary. *Sepals* about $2\frac{1}{2}$ mm. long, scantily pubescent on the upper side, glabrous below; outer boat-shaped, inner elliptical or obovate-elliptical. *Anthers* oblong, 1 mm. long. *Fruit* dry.

A shrub, 3–5 feet or more in height, with ascending branches, leafy and much branched above. Western South Africa, extending from the neighbourhood of Tulbagh northwards to the Khamiesberg and Vogel Klip in Little Namaqualand and eastward beyond Matjesfontein on the Karroo.

Easily distinguished as a rule by the small four-ranked leaves, very truncate or hump-backed in profile, and the rather thick blunt bracts usually with three longitudinal ribs and more or less prominent reticulation between. In habit it resembles *P. vulgaris* but with a rounded, rather than plume-like, grouping of the foliage.

Young plants from the Western Karroo near Matjesfontein and elsewhere have the leaves not conspicuously truncate, though leaves approaching the typical truncate form can usually be found here and there.

The cells of the outer epidermis of the leaves have mucilaginous inner walls. The hump at the back of the leaf apex is formed by a short knot of fibres which behave like the wandering fibres described for other species but within narrow limits (see below under 12, *P. vulgaris*).

CAPE PROVINCE. Tulbagh Div.: Tulbagh, *Pappe*, *Marloth* 4238, *Rogers* 17368; near Tulbagh waterfall, *Zeyher* 43; mountains near Saron, 3000 ft., *M. Schlechter* 1799, 10660; hills near Saron, 1000 ft., *M. Schlechter* 10627; fields, Piquetberg Rd. [now Porterville Rd. Sta.], *W. Tyson* 2318; sandstone outcrops, Vogel Vlei, *Compton*. Worcester Div.: summit of Tafelberg, at head of Hex River Pass, *Pillans*; summit of kopje behind Osplaats Sta., Hex River Pass, *Thoday*; Touws River, kopjes, *Thoday* 85; Tweeside flats, 1050 m., *Marloth* 10798. Laingsburg Div.: near base of Witteberg S. of Matjesfontein, *Thoday*; Whitehill near Matjesfontein, *Thoday* 213. Ceres Div.: Ravine, Matroosberg, near Laaken Vlei, 3500 ft., *E. P. Phillips* 2057; Farm Driefontein, Cold Bokkeveld, 1100 m., *Marloth* 10668. Piquetberg Div.: Piquetberg, *G.*

Edwards in Herb. Bolus. 14412. Clanwilliam Div.: Ezelsbank, 4–5000 ft. [Cederbergen], *Drège*; Clanwilliam, *Union Dept. of Agric. Govt. Herb.* 11538; Graafwater, *Compton*; Claypan, *Compton*. Little Namaqualand: Leliefontein, 4000–5000 ft., *Drège*; near Spektakel, 3000 ft., *Bolus* 9507; Reitkloof Mtn., *Pearson* 5709; Zuurberg (Anegas), *Pearson* 6256; Khamiesberg, hills above Twee Rivieren, *Pearson* 6773; Vogel Klip, *Pearson and Pillans* 5928. Locality not precisely given: Tafelberg, C.P., *Kassner in Herb. Transvaal Mus.* 12850.

A specimen collected by Mr. Stokoe as far south as the Groot Drakenstein Mts. (near French Hoek) probably belongs here, though only the earliest traces of a few inflorescences were present and the majority of the leaves were hardly truncate.

3. *P. pendula* Ecklon & Zeyher ex Meisn. in DC. Prodr. xiv. 563; species adhuc non descripta, aspectu *P. rigidae* similis sed spicis saepe elongatis, bracteis rhomboideis extus convexis marginibus lateralibus fulvis scariosis sulcatis ciliatis differt. — *P. rigida* var. *comosa* Meisn. in DC. Prodr. xiv. 563 (partly).

Young stems thickly woolly. *Leaves* 2–3 mm. long, ovate-oblong to lanceolate, convex on the back or obtusely angled towards the apex, appressed. *Inflorescences* spicate, often elongated, at first terminal; axes comose. *Bracts* rhombic, about 4 mm. long, smooth and convex on the back, veined towards the brown subscarious ciliate margins, comose within. *Receptacle* tube about $3\frac{1}{2}$ mm. long; base only slightly dilated, narrowly elliptical, nearly glabrous; neck about half as long, pubescent without, slightly hairy within the throat. *Sepals* narrow, 3 mm. long, hairy on the upper side; outer boat-shaped, inner oblong or oblanceolate. *Anthers* 1 mm. long or slightly longer.

I have not seen this species growing and adopt Ecklon and Zeyher's name for it without any implication as to its usual habit. Other species are sometimes pendulous in shade and shelter.

The species superficially resembles *P. rubra* in its inflorescences, and in vegetative characters some forms of *P. rigida*. It is distinguishable from both by the bracts, from the former also by the shorter wider leaves. The leaves differ anatomically from those of *P. rigida* in the absence of wandering hypodermal fibres.

CAPE PROVINCE. Uniondale Div.: Longkloof, between Ongelegen and Misgund, 2700 ft., *Fourcade* 1708. Uitenhage Div.: Stony bed of Zwartkops River, *Zeyher* 44; Zwartkops R., *Zeyher* 7381; sandy places near Zwartkops R., *Zeyher* 1025. Port Elizabeth Div.: sandy ground in Krakakama, *Ecklon & Zeyher* 3780, 3781.

4. *Passerina Burchellii* Thod. sp. nov.; foliis latis apice barbatis, bracteis similibus intus comosis, sepalis extus apice barbatis, antheris parvis distincta. *P. rigida* var. *comosa* Meisn. in DC.

Prodr. xiv. 563, partly (ex MS. in Herb. Kew.). *P. tetragona* Burchell MS. in Herb. Kew. non Steud.

Young stems thickly whitish pubescent. *Leaves* 2–2½ mm. long, adpressed, ovate to obovate, concave, involute at the tip, smooth and convex on the back or at the apex obtusely angled, subacute, with a tuft of erect hairs behind the apex and shortly ciliate margin; comose within. *Inflorescences* spicate, soon left behind by further vegetative growth. *Bracts* like the leaves but larger, thick, smooth and convex on the back, comose within, about 3 mm. long by 2 mm. wide. *Receptacle* tube 3 mm. long, little dilated, lanceolate, compressed, ribbed, scantily pubescent in the upper part, subglabrous below, hairy within, splitting off as a whole. *Sepals* about 2½ mm. long, slightly hairy above, hairy also on the under side near the tip; outer boat-shaped, keeled, inner obovate. *Stamens* with small anthers and slender filaments; filaments of the longer stamens longer than the sepals; anthers elliptical, about ½ mm. long.

Apparently a dwarf species less than a foot high growing in crevices of rocks, with many erect branches arising from a woody base; but this habit may be partly the result of veld fires, as some of the specimens are obviously charred at the base. Only known from one locality.

The stamens and the bearded sepals and leaves distinguish this species from both *P. rigida* and *P. pendula*.

SOUTH WESTERN CAPE PROVINCE. Caledon Div.: Mountain tops of Baviaans Kloof near Genadendal (collected in 1815), Burchell 7761; mountain summit near Genadendal c. 4900 ft. (collected in 1885), Bolus in Herb. Norm. 687.

5. *P. rubra* C. H. Wright in Fl. Cap. v. ii. p. 12.—*P. filiformis* var. *squarrosa* Meisn. in DC. Prodr. xiv. p. 562 (*Zeyher* 3779! I have not seen Ecklon 598).

Young stems closely woolly. Internodes on leading branches sometimes longer than the leaves. *Leaves* 3–6 mm. long, rarely longer, appressed or slightly spreading, a little wider at the base, at the apex laterally compressed, shortly keeled, obtuse and sometimes bearing a few hairs. *Inflorescences* spicate, often very long and lax with many flowers, vegetative growth ultimately resumed beyond them; axis thickly comose, the wool sometimes protruding conspicuously between the bracts. *Bracts* usually somewhat spreading and rendering the inflorescences squarrose, 3–4 mm. long, ovate-acuminate, with short blunt point often subtruncate in profile, strongly but finely ribbed, comose within, margin with persistent fringe of long hairs. *Receptacle* tube about 3 mm. long, glabrous within; base dilated but narrow, glabrous, ribbed; neck slender, rather shorter than the base, pubescent just below the sepals, otherwise glabrous or nearly so, circumscissile above the fruit. *Sepals* about 2 mm. long, outer concave or boat-shaped, with a few long hairs behind the apex (sometimes wanting), inner elliptical

or obovate-oblong, scantily pubescent above. *Anthers* ovate or oblong, $\frac{2}{3}$ to 1 mm. long, rather narrow.

I have not seen this species growing, and have no information as to its habit or height.

CAPE PROVINCE. Riversdale Div.: Muiskraal near Garcias Pass, 1200 ft., *Galpin* 4492. Uniondale Div.: Keurbooms River, Longkloof, 2000 ft., *Fourcade* 1646. Port Elizabeth and Uitenhage Divs: Uitenhage Div., *Zeyher* 156; Uitenhage Distr., *Miss Macdonald* 4; Redhouse, *Mrs. T. V. Paterson* 833; Aloes, *T. L. Drège*; Bethelsdorp, *Mrs. T. V. Paterson* 270; hill sides near Port Elizabeth, 300 ft., *Bolus* 1905; slopes around Port Elizabeth, 200 ft., *Tyson* 2178; calcareous soil near Cradocktown, Algoa Bay, E. side of Port Elizabeth, *Zeyher* 3779. Albany Div.: West Hill near Grahamstown, *Bennie*; Brak Kloof [11 m. N.W. of Grahamstown], *Mrs. G. White* 1063.

Some of *MacOwan's* specimens numbered 103 belong here, the locality being given either 'Mts. near Howisons Poort 2000 ft.' or 'Hills near Grahamstown 2000 ft.', Albany Div.

6. *Passerina obtusifolia* *Thod.* sp. nov.; foliis patentibus linearibus apice rotundatis, spicis densis, bracteis apice foliis similibus basi parum dilatatis sulcatis distincta.

Young stems shortly tomentose. *Leaves* spreading, 4-8 or rarely up to 12 mm. long, strictly linear, straight or incurved or sometimes slightly recurved, with blunt rounded apex which bears while very young, in the bud, a tuft of short erect hairs. *Inflorescences* spicate, dense, terminal, some of the branches resuming vegetative growth after flowering. *Bracts* shorter than the leaves, with leaf-like tip and little dilated base having one or two, rarely three, prominent ribs on each side, hirsute within. *Receptacle* tube short; base dilated, nearly glabrous, about 2 mm. long; neck about half as long, loosely pubescent, bent outwards at the top, glabrous or hairy within. *Sepals* rather narrow, hairy on the upper side; inner obovate-oblong. *Anthers* narrow, ovoid, 1-1½ mm. long.

A shrub, 1 to 4 or 5 feet high, with several fairly stout stems bare below and branching profusely above as in *P. vulgaris*; but the stout, blunt, linear, spreading leaves are distinctive.

CAPE PROVINCE. Clanwilliam Div.: Claypan Sta., *Compton*; Worcester Div.: Hex River Pass, Orchard Siding, 1400 ft., *Rogers* 16701; de Doorns, *Thoday* 86-91; between Osplaats and Tunnel Sidings, 2-3000 ft., *Rogers* 16703, 16705. Montagu Div.: mountain slopes near Montagu [Langebergen], *Miss Page*, *Thoday*. Laingsburg Div.: Witteberg near Whitehill and near Matjesfontein, *Thoday* 214; mountains round Seven Weeks Poort, *E. P. Phillips* 1503. Steytlerville Div.: De Hoek, Winterhoek Range, *Haughton*. Humansdorp Div.: Groot Hoek, Zitzikama, 700 ft., *Fourcade* 741. Port Elizabeth Div.: Port Elizabeth, *Florence Paterson* 833. Uitenhage Div.: Zwartkops River, Uitenhage, *Pappe*. Albany Div.: Alicedale,

Marloth 4273; Mts. near Howisons Poort, *MacOwan* 103 (part), *Atherstone*; Grahamstown, *Rogers* 2235; stony ridges, Grahamstown, Hounsloew Farm, and Niemands Poort near Grahamstown, *Galpin* 178; Zwartwater Poort, *Burchell* 3419; Highlands, *Daly* and *Sole* 297.

7. *P. falcifolia* C. H. Wright in Fl. Cap. v. ii. p. 10.—*P. filiformis* var. *divaricata* Wikstr. in Vet. Acad. Handl. Stockh. 1818, 325, and MS. in Herb. Thunb. *P. filiformis* var. *falcifolia* Meisn. in Linnaea xiv. 399 and DC. Prodr. xiv. 562 (? partly).

Young stems thickly pubescent. *Leaves* 6–10 mm. or sometimes up to 15 mm. long, spreading, falcate, gradually tapering in profile from base to apex, angled on the back and bearing at least when young a single median row of hairs each bent upwards at the base. *Inflorescences* spicate, at first terminal on the ultimate branches, but vegetative growth resumed beyond them. *Bracts* about 6 mm. long and 3–4 mm. wide (uppermost shorter), more or less spreading, ovate-acuminate with leaf-like tip, wings prominently veined, closely woolly all over within. *Receptacle* tube 5–6 mm. long, finely pilose within; base dilated, compressed, pubescent, persistent; neck slender, exserted, white woolly-pubescent, constricted and ultimately circumscissile above the fruit. *Sepals* glabrous on the lower side, pubescent on the upper side, 3 mm. long, elliptical, outer ones concave. *Anthers* narrow, ovoid, $1\frac{1}{2}$ mm. long. *Fruit* dry.

A shrub or small tree, reaching in sheltered situations on the margins of forests a height of 15 to 20 ft., of light and graceful habit, with slender pendulous ultimate branches. Outside the forest it sometimes assumes a more sturdy habit as a shrub up to 6 or 7 feet high with erect branches and less spreading leaves which are often scabrid with the stouter prominent bases of the hairs along the back. Apparently confined to the forest region of the Outeniqua and Zitzikama Ranges.

This species is superficially very like some forms of *P. filiformis*, but bracts, flowers and leaves differ by characters which make it difficult to regard the two even as closely allied.

CAPE PROVINCE. Mossel Bay Div.: Ruyterbosch, Mossel Bay, *Miss L. Britten* 130. George Div.: Mts., *Mund*; near George, Montagu Pass, and between George and the Wilderness, *Thoday* 92–97; Wolfdrift, Malgaten River, *Burchell* 6109. Knysna Div.: Knysna, *Rogers* 27004; wood sides, Plettenberg Bay and the Knysna, *Bowie* 5; Blaauw Kranz, Knysna, *W. Tyson* 1449. Humansdorp Div.: [?] Ratels Bosch, the Zitzikama, 650 ft., *Fourcade* 74; Diep R. valley near Humansdorp, *Bolus* 2440 (part). Uitenhage Div.: stony channel of Zwartkops River, *Zeyher* 277; Vanstaadesberg, stony places, 1000–3000 ft., near Uitenhage, *Drège*.

8. *P. comosa* C. H. Wright in Fl. Cap. v. ii. p. 11.—*P. filiformis*

var. *comosa* Meisn. in DC. Prodr. xiv. p. 562. *P. falciformis* Drège, Zwei Pfl. Documente p. 208.

Young stems closely woolly or pubescent. *Leaves* up to 7 mm. long or rarely longer on the leading branches, more or less spreading, linear, hairy on the back towards the apex at least when young, the older ones sometimes rugose or warty with the bases of fallen hairs. *Inflorescences* spicate, vegetative growth ultimately resumed beyond them. *Bracts* broadly ovate, hairy without or more or less glabrescent towards the base, wings submembranous and glabrous within towards the margins. *Receptacle* tube about 4 mm. long, glabrous within; base dilated, shortly puberulent, persistent; neck pubescent, circumscissile above the ovary. *Sepals* 2–2½ mm. long, glabrous on the upper side, hairy at the tip on the lower side; outer broadly elliptical, concave, inner elliptical or obovate. *Anthers* about ⅔ mm. long, broadly ovoid or elliptical.

A small shrub similar in habit to *P. filiformis* and probably closely allied to it, but differing in the smaller more or less hairy leaves and the hairy ovate bracts not produced into a leaf-like point. Near Concordia, at the Western end of the Little Karroo, it reached a height of not more than 2 feet. The specimens, like those from other southerly localities, were softly and not so conspicuously hairy as the type specimens collected by Drège in Little Namaqualand, which appear to represent an extreme form. *Marloth* 10817 is a sturdy form with numerous dilated imbricate transitional leaves below the fertile bracts.

CAPE PROVINCE. Montagu Div.: near Concordia, *Thoday* 212. Worcester Div.: Tafelberg, 3000 ft., Hex R. Valley, *Pillans in Herb. Bolus*. 17159. Laingsburg Div.: quartzite mtn., Tweeside, 15 miles W. of Matjesfontein, 1300 m., *Marloth* 10817. Sutherland Div.: Farm Uitkyk, Roggeveld, 1450 m., *Marloth* 9695. Little Namaqualand: between Pedros Kloof and Leliefontein, 3–4000 ft., Khamiesberg Range, *Drège* 2570.

9. *P. filiformis* Linn. Sp. Pl. ed. i. 559; MS. in Herb. Linn. Descr. Linn. addenda; foliis et sepalis exterioribus apice barbatis, bractearum alis membranaceis glabris.

I include here a cultivated specimen from Gay's herbarium (now at Kew) labelled "Ex tepidariis Celsianis dedit Hardy, October 1816," which Mr. N. E. Brown identified in 1903 with specimens from the Berlin Herbarium named *Passerina cupressina* Wendl. Hort. and *Passerina pectinata* Hort., which he found to be identical. The latter name appeared in Loddiges' Catalogue, 1816, p. 18, and Meisner in Linnaea, xiv. p. 404 (1840) quotes it among the species unknown to him as "Bartl. MSS." In the same place he also mentions "*P. cupressina* Wendl. Hort."

Young stems pubescent. *Leaves* 4–15 mm. long, more or less spreading, straight or incurved, narrow linear or slightly tapering in profile or those below the inflorescences widening

towards the base ; at the apex bearing a more or less persistent tuft of erect hairs. *Inflorescences* spicate, at first terminal but vegetative growth often resumed beyond them even before the flowers open. *Bracts* 4–10 mm. long with leaf-like tip and membranous wings ; wings often abrupt, more or less obscurely veined and glabrous within. *Receptacle* tube 3–5 mm. long, glabrous within, pubescent without ; base dilated, compressed, persistent ; neck slender, sometimes exserted, circumscissile above the fruit. *Sepals* glabrous above, $2\frac{1}{2}$ –3 mm. long ; outer boat-shaped with long loose beard on the back behind the tip ; inner obovate to broadly ovate, slightly concave, glabrous on the lower side or with a few hairs behind the inflexed tip. *Anthers* 1 mm. long, ovoid.

A species with a wide range and somewhat variable. In the Cape Peninsula it is a shrub up to 6 ft. high, of broadly rounded form with straight narrow linear spreading leaves, but in shade it assumes a lax habit with pendulous branches. The type specimen in Herb. Linn. agrees so closely with the Cape Peninsula form that there can be little doubt but that it was collected there.

In Natal Medley Wood described one specimen as a small tree (Wood 1182), and in the eastern part of its range the species appears to be generally more robust and luxuriant in its growth. All the parts tend to be larger, the membranous wings of the bracts more conspicuous and the leaves for some distance below the inflorescence more or less expanded towards the base. Some specimens with incurved tapering leaves, exserted receptacle tubes and veined bract wings bear a striking superficial resemblance to *P. falcifolia*, though they can be distinguished at once by the apical beard on leaves and outer sepals and by the glabrous inner side of the bract wings.

The specimens collected on sandy ground at Langeenheid, Malmesbury Div., differed from the Cape Peninsula form in being glutinous, so much so that the beard on the sepals was adherent and difficult to detect, also in a tendency to elongation of the inflorescence, in the ovate acuminate bracts narrowing gradually to the apex instead of having a distinctly leaf-like tip, and in the narrower leaves. I regard this as a distinct variety and propose to call it *P. filiformis* var. **glutinosa** Thod. Schlechter 5125 from sandy places farther north agrees with it closely, except for the glutinous character of which in the dried specimens no trace is left.

CAPE PROVINCE. Clanwilliam Div.: sandy places near Alexanders Hoek, 3–400 ft., Schlechter 3439, 5125 (var. *glutinosa*). Malmesbury Div.: round Langeenheid Sta., Thoday 215 (var. *glutinosa*). Cape Peninsula : near Cape Town, Burchell 66, 276, Bolus 2925 ; W. side of Signal Hill, F. Wilms 3590 ; close to Signal Station, Woolley Dod 3103. Caledon Div.: Steenbras, Rogers 17835. Riversdale Div.: Great Valsch River, Burchell 6544. Mossel Bay Div.: Attacquas Kloof, Gill. Knysna Div.:

Redlands, *Keet in Forest Dept. Herb.* 3599. Humansdorp Div.: Diep R. valley, near Humansdorp, *Bolus* 2440 (partly).

TRANSKEI, ETC. Transkei: Qolora River bank, Kentani, 1000 ft., *Alice Pegler* 1273. Tembuland: Ecutyeni, near All Saints, *R. Baur* 1162. Pondoland: banks of R. Umkwani, *W. Tyson* 2621. Griqualand East: sides of Mt. Ingeli, 6500 ft., *W. Tyson* 1287.

NATAL. *W. T. Gerrard* 1478. Durban Div.: hills above Pinetown, 2400 ft., and Botha's Hill, 2400 ft., *J. M. Wood*; Botha's, 2000 ft., *J. M. Wood* 3938; Inanda, *J. M. Wood* 1182. Polela Div.: high veld above Xalinquena, *Fernandez* 144. Weenan Div.: Table Mtn. [Drakensberg, NE. of Giants Castle, 6500 ft.], *Bews*.

10. **P. Galpini** *C. H. Wright* in *Fl. Cap.* v. ii. p. 10.

Young stems puberulent. *Leaves* thick, 4–6 mm. long, linear, obtuse, strongly incurved towards the apex, suberect but not appressed, convex and glabrous on the back, apex bearing in the bud a broad tuft of short hairs. *Inflorescences* dense, spicate, terminal or vegetative growth resumed beyond them. *Bracts* wide, with short leaf-like point and large rounded membranous wings glabrous within and faintly veined, up to 5 mm. long and broad. *Receptacle* tube about 3 mm. long, little dilated below, narrowing gradually to a very short neck, puberulent without, glabrous within. *Sepals* wide, glabrous, $2\frac{1}{2}$ –3 mm. long; outer broadly elliptical, concave, inner obovate or subrotund. *Longer stamens* often longer than the sepals; anthers broadly ovoid, 1 mm. long.

Probably allied to *P. filiformis* from which it differs in the stouter obtuse incurved leaves, glabrous sepals and short-necked receptacle tube.

CAPE PROVINCE. Riversdale Div.: near Milkwoodfontein, 600 ft., *Galpin* 4491. Mossel Bay Div.: Mossel Bay, *Rogers* 26921.

Without locality, *G. Potts* 1017.

11. **Passerina paludosa** *Thod.* sp. nov.; affinis *P. filiformi*, sed foliis erectis latioribus, bracteis apice latioribus, florum tubis gracilioribus basi minoribus, differt.

Young stems more or less pubescent. *Leaves* erect, nearly straight, often appressed or imbricate, 3–8 mm. or rarely 10 mm. long, up to 2 mm. or more wide, the longer ones narrow lanceolate, the shorter lanceolate to ovate, convex or obtusely angled and glabrous on the back, with ciliate margin and apex often coloured, bearing a persistent tuft of white erect hairs. *Inflorescences* spicate, at first terminal, but vegetative growth quickly resumed beyond them. *Bracts* ovate, acuminate with a broad point like the leaves and faintly veined membranous wings glabrous within. *Receptacle* about 4 mm. long, pubescent without, glabrous within, the neck slender, longer than the small dilated base, circumscissile above the fruit. *Sepals*

about 3 mm. long; outer boat-shaped with a tuft of hairs behind the apex, inner obovate, glabrous. *Anthers* ovoid, $\frac{2}{3}$ –1 mm. long.

A shrub with few rather lax terete stems, bare below, branched and leafy above, occasionally reaching 10 feet in height, but generally not exceeding 3–6 feet.

In many respects similar to *P. filiformis*, but strikingly different in habit and leaf.

CAPE PROVINCE. Cape Div.: vleis and marshy ground, Cape Flats, *Thoday* 100, &c.; Muizenberg Plateau, *E. Kensit*.

12. *Passerina vulgaris* *Thod.* sp. nov.; foliis erectis linearibus extus glabris obscure striatis, bracteis ovatis acuminatis in longitudine plicatis quasi striatis intus breviter lanatis, sepalis extus glabris, distincta.—*P. filiformis* var. α *vulgaris* Meisn. in DC. Prodr. xiv. 562. *P. corymbosa* Eckl. ex Meisn. l.c. (*Zeyher* s.n. in Herb. Kew. ! *E. & Z.* n. 40, fide Meisner). *P. filiformis* C. H. Wright in Fl. Cap. v. ii. p. 10 (partly) not of Linn.

Young stems white pubescent, often with patent white tufts below the leaves. *Leaves* 2–10 mm. long, erect, sometimes appressed, more often diverging somewhat, linear, a little incurved and slightly tapering towards the apex, glabrous on the back, with three or more veins visible as faint striae when fresh. *Inflorescences* spicate, at first terminal but vegetative growth continuing beyond them; axes usually conspicuous after fruiting as white comose leafless intervals on the branches. *Bracts* 4–6 mm. long, ovate-acuminate, with leaf-like point, shorter or sometimes wanting in the upper ones, and 3 to 6 close parallel folds on each side, shortly woolly all over within, glabrous without. *Receptacle* tube about 4 mm. long; base inflated, compressed, puberulent in the upper third, glabrous below, for a time persisting round the fruit, ultimately often splitting off; neck whitish-pubescent, circumscissile above the fruit, slightly hairy within the throat or rarely quite glabrous within. *Sepals* about 3 mm. long, glabrous or on the upper side slightly puberulent; outer boat-shaped, inner obovate, slightly concave. *Anthers* ovoid, 1 mm. long. *Pericarp* fleshy at the side below the style, elsewhere thin and membranous.

A shrub with slender erect terete usually reddish stems up to 6 or 8 or sometimes 10 or 11 feet high, bare below, much branched and leafy above, the branches ascending, subfastigiate, or in sheltered situations somewhat pendulous.

This is by far the commonest species. It is readily distinguished from other species by the bracts, the close parallel folds reduplicating the structure of the grooved leaf. The wandering hypodermal fibres present in the leaves⁽¹⁾ are only

⁽¹⁾ *Thoday*, *Annals of Botany*, 35, 1921, p. 585, where the species is referred to as *P. filiformis*.

found similarly developed in two other species, *P. rigida* and *P. paleacea* (but see also under 2, *P. glomerata*).

CAPE PROVINCE. Malmesbury Div.: low kopjes near Langebaan, Saldanha Bay, *E. L. Stephens*; Hopefield, *Thoday*. Cape Peninsula: near Cape Town, *Burchell* 473, 66 (part). *Marloth* 1585, 2756; near Newlands, *Zeyher* 3782; Muizenberg, *Caporn in Herb. Guthr.*; Kalk Bay, on mountain, 100–600 ft., *G. Potts* 2294; Simons Bay, *C. Wright*; sandy shore, Camps Bay, *Moss* 3237. Cape Div.: Belleville, on sand, *Rogers* 17281. Stellenbosch Div.: Stellenbosch, *G. Potts* 1402; French Hoek, between Kriels and foot of Pass, 1000 ft., *Phillips* 1294; Jonkers Hoek, *N. S. Pillans in Herb. Bolus* 15416. Paarl Div. Mtn., Paarl, 800 ft., *Bolus* 2924. Tulbagh Div.: Tulbagh Valley, *Zeyher* 43 (part). Ceres Div.: top of Michell's Pass, 500 m., *Marloth* 10693; Ceres, *Miss Guthrie*. Worcester Div.: near Goudini Rd. and Breede R. Stations, *Thoday*. Montagu Div.: Cogmans Kloof, 280 m., *O. Kuntze*. Caledon Div.: Steenbras, *Rogers* 17835; Kogel Bay, *M. R. Mitchell*; Hermanus, *M. de Beer in Herb. Transvaal Mus.* 16536, *Rogers* 26574; Mossel River, *G. Potts* 1617; slopes at Bot. R. Sta., margins of streams at Elgin, and (rare) Waterkloof, Caledon, *Pillans*. Swellendam Div.: Swellendam, *Zeyher*: 1000–4000 ft., *Ecklon and Zeyher*; 1200–2000 ft. *Burke* 45. Riversdale Div.: Albertinia, *Dr. J. Muir* 683; hills near Zoetemelks R., *Burchell* 6781. Mossel Bay Div.: between Great and Little Brak Rivers, *Burchell* 6163; Cloetes Pass, *Dr. J. Muir* 2401; Mossel Bay, *Rogers* 26920. Knysna Div.: scrub at base of Knysna Heads, *Schönland* 3398–3525; Buffalo Bay, *Knysna. Keet* 851; Keurboom River Hill, 600 ft., *Fourcade* 1478, 1479; Formosa, Plettenberg Bay, 200 ft., *Fourcade* 1484. Port Elizabeth Div.: Port Elizabeth, *I. L. Drège in Herb. Transvaal Mus.* 10800; drift sands, *Sim*, 20; German School, *I. L. Drège* 285. Uitenhage Div.: Redhouse, *Paterson* 833. Albany Div.: Grahamstown, *Breijer in Herb. Transvaal Mus.* 16898; 1850 ft., *Rogers* 1564; Hope's Garden Hill, Grahamstown, *Galpin* 251; Signal Hill, Grahamstown, on Witteberg Sandstones, *Britten* 2811, 2812; stony slopes near Grahamstown, 2200 ft., *MacOwan* 103 (part); Highlands, *Daly and Sole* 297; Coldspring, *J. Glass* 178. Bathurst Div.: Port Alfred, *Schönland* 302; near Port Alfred, *Burchell* 3835, 3950. King Williamstown Div.: Mt. Coke, 1000 ft., by river, *Sim* 2234; Mt. Coke, 100 ft., *Sim* 1499 (= *Sim* 1380); Woolf River Plateau, Amatola Range, 4500 ft., *F. J. Stayner* 24. East London Div.: East London, *Breijer in Herb. Transvaal Mus.* 16577. Queenstown Div.: beside streamlet on Junction Farm, Gwatigu, 2500 ft., *Galpin* 8279. Graaff Reinet Div.: Mtn. summit, Oudeberg, near Graaff Reinet, 5000 ft., and sides of Sneeuwberg Mts., 5000–7500 ft., *Bolus* 170.

NATAL. District Alexandra, Station Dumisa, 700 m. rock-kranzes [?] Emsdale, *H. Rudatis* 1204.

Whether Meisner included also the true *P. filiformis* Linn.

under his var. α I cannot say, as I have not seen all the specimens he quotes. *Burchell* 66 in Herb. Kew. includes specimens of both.

I have not seen *E. & Z.* 40 which is quoted by Meisner in support of the synonymy of Ecklon's name with his *P. filiformis* var. α *vulgaris*. I infer, however, from Zeyher's specimen in Herb. Kew. and *Bolus* 170, which was identified by Professor D. Oliver as *P. corymbosa* Eckl., that Ecklon applied the name to an extreme form of this species. The name does not fit the common form. Wright in Flor. Cap. has applied it to a mixed group of specimens belonging to several species, apparently on the basis of the subcorymbose character of the inflorescences. In order to avoid confusion I reject Ecklon's *nomen nudum* and adopt Meisner's varietal name as eminently fitting the commonest species of the genus.

13. **P. paleacea** Wikstrom in Vet. Acad. Handl. Stockh. 1818, 323 and MS. in Herb. Thunb.—*Lachnaea paleacea* Herb. Banks. fide Wikstrom, loc. cit. *Passerina glomerata α Thunberg MS. in Herb. propr.*

Young stems densely, often thickly woolly. *Leaves* small, imbricate, appressed, four-ranked, 2 mm. long or up to 4, rarely 6 mm., on the leading branches. wider at the base and convex on the back, laterally compressed at the apex, the median vein visible in the upper half and usually forming a distinct keel incurved at the apex; leaves below the inflorescences usually dilated. *Spikes* dense, oblong or subrotund, mostly terminal, a few left behind by further vegetative growth of leading branches. *Bracts* 3 mm. long or less, subrotund, concave, blunt, or sometimes with very short obtuse point, convex and smooth on the back or obtusely keeled at the apex, sometimes finely striate towards the upper margins, usually with narrow, thin and membranous, pale or coloured, ciliate edge. *Receptacle* tube short, included, hardly more than 2 mm. long, cylindrical, compressed, or ultimately the lower part dilated round the fruit, glabrous or nearly so without, slightly hairy within in the upper part, splitting off as a whole or sometimes circumscissile above the fruit. *Sepals* patent, close against the inflorescence, glabrous, thin and membranous; outer elliptical or subrotund, concave, about 2 mm. long, inner obovate, slightly longer. *Anthers* $\frac{2}{3}$ mm. long or less, cordate. *Fruit* dry.

A small shrub with ascending branches, growing on drift sand, usually 1–3 feet in height, occasionally up to 6 feet in the shelter of other shrubs, but near the sea dwarf and prostrate.

Very similar in leaf to *P. rigida* of which without the flowers it might be taken for a small form; but it differs in the small glabrous flowers, the smooth thin blunt bracts and the dry fruit.

Wandering hypodermal fibres (cf. *P. vulgaris* and *P. rigida*) are present in the distal half of the leaves, reinforcing the median bundle, so forming the keel, and spreading for a short distance laterally from it in large numbers.

CAPE PROVINCE. Cape Div.: Blaauwberg Strand, *Tredgold*; Cape Flats, *Burchell* 8389, *Thoday* 25 etc.; Belleville, *Rogers* 16358; Raapenburg, *Guthrie* 1039; sandy places near Wynberg, *Bolus* 2926; sandy flats near Muizenberg, *Thoday* 74, 62; Kalk Bay, *Rogers* 16082; dry dunes, Fish Hoek, *C. E. Moss* 3236; Simons Bay, *C. Wright*; shore beyond Simonstown, *Wolley Dod* 2927; sand hills N.W. of Simonstown, *Pillans* 3783; Karbonkelberg and Little Lion's Head, *Thoday* 76; Kommetje (Slangkop Pt.), *Thoday* 67. Stellenbosch Div.: Bottelary, *L. Bolus in Herb. Bolus* 17197; drift sand between Somerset Strand and Gordons Bay, *Thoday* 24. Caledon Div.: Kogel Bay, fide *M. R. Mitchell*; Mossel River, *E. L. Stephens*; Hermanus, *M. R. Mitchell*.

One of Drège's specimens in Herb. Kew. belongs here. Meisner's identification is *P. ericoides* L. for which the locality given in Drège, Zwei Pfl. Documente is "Between Grosberg-rivier and Waterval, 2500-3000 ft." (van Rhyn's Dorp or Calvinia Div.). This is probably an error due to confusion with *P. glomerata*.

14. *P. rigida* *Wikstrom* in Vet. Acad. Handl. Stockh. 1818, 326 and MS. in Herb. Thunb.—*P. rigida* Meisn. in DC. Prodr. xiv. 563, and Linnaea xiv, 402, partly. *P. eriophora* Gandoger in Bull. Soc. Bot. France lv. 418 (1913). (The specimen quoted as *J. M. Wood* 1702 is apparently an error for *J. M. Wood* 1712. The description and locality also both indicate *P. rigida*.)

Young stems thickly tomentose or woolly. *Leaves* appressed, imbricate, four-ranked, 2-4 mm. long or rarely longer on the leading branches, narrow-lanceolate to ovate, convex on the back, wider at the base, laterally compressed towards the tip, the median vein usually visible in the upper half often as a blunt keel, sometimes also part of a lateral vein visible on each flank. *Inflorescences* short, spicate, terminal, often left behind ultimately by further growth on the leading branches, axes thickly comose after fruiting. *Bracts* thick, shortly acuminate, wide, with few shallow parallel furrows, usually obsolescent towards the base, or rarely smooth, closely woolly within. *Receptacle* tube 3-3½ mm. long, base inflated, ribbed, glabrous, ultimately splitting from the fruit, neck short, pubescent without, more or less pubescent within, circumscissile above the ovary. *Sepals* about 2½ mm. long, usually rather narrow, glabrous on the lower, downy on the upper side; outer ones boat-shaped, inner obovate. *Anthers* oblong, about 1 mm. long. *Pericarp* inflated, yellow or orange, subsucculent, fruit round, 3 mm. long and wide.

A robust shrub up to 6ft. high or more, with stout erect stems, the branches bearing numerous short, straight, ascending or rarely lax leafy twigs, growing on sand dunes near the sea from False Bay eastwards to Natal.

This species is sturdier than *P. vulgaris*, with stouter stems, though somewhat similar in habit. It differs from it also in

the fleshy coloured fruit, the leaves distinctly wider towards the base, the wider bracts with fewer shallower folds and in the woolliness of the young stems. Leaves and twigs are very like those of *P. paleacea* but larger and more robust.

Wandering fibres reinforce the median veins as in *P. paleacea* and *P. vulgaris*. They also wander hypodermally between it and the lateral veins rather loosely, much as in *P. vulgaris*, and the two principal lateral veins are reinforced.

CAPE PROVINCE. Cape Div.: floating dunes near Muizenberg, *Thoday* 59, 64, 70. Caledon Div.: Kogel Bay (False Bay), *M. R. Mitchell*. Mossel Bay Div.: fore dunes and drift sand E. of Mossel Bay, *Thoday*. George Div.: fore dunes at 'The Wilderness', *Thoday*. Knysna Div.: Knysna, *Duthie* 533; Buffalo Bay, Knysna, *Keet* 873; Plettenberg's Bay, *Leipoldt in Herb. Bolus* 17084. Port Elizabeth Div.: Port Elizabeth, *W. Kemsley* 141; sand dunes and rocky shore, *Drège*; shore near Port Elizabeth, *Zeyher* 405; Humewood, *Paterson* 1123. Uitenhage Div.: Redhouse, *Paterson* 270; sand dunes, mouth of Coega R., *Zeyher* 3777. Bathurst Div.: Port Alfred, *Atherstone* 315. sand dunes, *Tyson in herb. Transvaal Mus.* 17233; between Kasuga [? Kariëga] R. and Port Alfred, *Burchell* 4049. East London Div.: East London, *G. Rattray* 194, *Sim* 1471, *J. Wood in Herb. Galpin* 3363, *Mrs. G. Fouché*; sand dunes near beach, 100 ft., *G. Potts* 1835; soft sand about 100 yards from beach, *O. Hilner* 184. Komgha Div.: near Kei Mouth, sand hills, 200 ft., *Flanagan* 418.

TRANSKEI, ETC. Port St. Johns, shoreward side of dune scrub, *Moss* 3238; Dunes at Embotzi Mouth, Distr. Lusikisiki, Pondoland, *O. B. Miller in Herb. Forest Dept.* 4410.

NATAL. Winkle Spruit, secondary dunes, *Rudatis* 1505; sand dunes, Isipingo, *Moss* 6001; near Durban (sea beach, and dunes up to 200 ft.), *J. M. Wood* 1712, 9139, *F. Wilms* 2277, *Moss* 6002, *Peddie*, *O. Kuntze*, *Sutherland*.

Locality not identified; Somerset, S. Africa, *Bowker*.

In addition to the above are three specimens recorded as from inland localities, viz. *Rogers* 1564, Grahamstown 1800 ft.; *T. Cooper* 2301, Howisons Poort, Albany Div.; and one without number or collector's name, but possibly one of *Ecklon and Zeyher's*, in *Herb. S. A. Mus.*, from mountains, Swellendam District. These exceptional localities seem to require confirmation, as all the other records are from sand dunes or sea shore. The first two, on the other hand, being both from the neighbourhood of Grahamstown, lend each other support. They agree with *P. rigida* not only in habit and in bract and flower characters, but also in leaf anatomy, wandering hypodermal fibres being present. Unfortunately there are no fruits.

15. *P. ericoides* Linn. Mant. 236 and MS. in *Herb. Linn.*—*Chymococca empetroides* Meisner in DC. Prodr. xiv. 565. *Passerina filiformis* var. *crassifolia* Eckl. & Zeyh. ex Meisn. l.c., nomen.

Young stems whitish-tomentose. *Leaves* 2-3 mm. long, oblong, obtuse, smooth and convex on the back. *Inflorescences* spicate, at first terminal, but vegetative growth usually resumed beyond them. *Bracts* like the leaves but slightly dilated at the base, smooth. *Receptacle* tube at first 2-3 mm. long, ovoid, with very short wide neck or none, but enlarging very early and becoming more or less rotund, pubescent without, hairy within at the throat and more scantily below, ultimately splitting and falling as a whole from the fruit. *Sepals* about 2 mm. long, subrotund or broadly obovate, concave, more or less pubescent on the upper side, glabrous on the lower. *Anthers* about 1 mm. long, subcordate. *Fruit* a round shining scarlet berry, 5-6 mm. in diameter.

A small shrub, 2-3 feet in height, with arcuate branches, growing on shifting dunes near the sea.

CAPE PROVINCE. Cape Div.: Blaauwberg Strand, crests of front dunes, fide *M. R. Mitchell*; "sands of Table Bay and S.E. Coast," *Bowie* 1; Zoutrivier [? Salt River near Capetown, ? *Pappe*] 42 in *Herb. S. A. Mus.*; sand dunes near Milnerton, *Thoday* 75; Camp Ground, Rondebosch, *M. M. Page*; Muizenberg, *Caporn*, sand hills, *F. Guthrie* 1437; Simons Bay, *C. Wright*; sandy shore of False Bay near Simonstown, *MacOwan* 3404; Lower North Battery, Simonstown, *Wolley Dod* 1878; dunes near Kommetje, *Thoday*. Caledon Div.: sand dunes, Mossel River, *E. L. Stephens*.

INCERTAE.

The following specimens constitute a small residuum of doubtful identity, representing perhaps either undescribed species inadequately, or forms of species already described from exceptional habitats or beyond the range at present recognised.

Burchell 7129, summit of Kampsche Berg, Riversdale Div.

Burchell 5929, Cradock Berg, near George.

These specimens come near to *P. comosa*.

Burchell 5929 has only very young inflorescences, the bracts of which are hairy on the back; but they are also hairy all over within and the leaves are not hairy nor even bearded. *Burchell* 7129 has bearded sepals, like *P. comosa*, but the receptacle tube is hairy within, the leaves are not hairy nor bearded at the apex even in the bud, while the bracts which are ovate with few shallow folds are hairy all over within and have at most a trace of hairiness on the back of the wings. Apart from the hairiness of the young bracts of *Burchell* 5929 the two specimens are very similar, with small narrow leaves about 3 mm. long, laterally compressed at the apex, and young stems thickly woolly.

Burchell 626, Table Mtn., Cape Peninsula.

This does not agree with any of the Cape Peninsula species. It was apparently not more than 6 inches high. The leaves

are more or less recurved and blunt, the bracts rather like those of *Burchell* 7129, shaggy within, the receptacle tube hairy within the throat, the sepals not bearded, the anthers very narrow, almost linear.

Bowie 2, Summit of the Traduberg, Cape of Good Hope. [? Tradouw's Pass, Langebergen, between Swellendam and Heidelberg.]

Schlechter 5846, Montagu Pass, 4500 ft. [between George and Oudtshoorn].

These two specimens agree fairly closely. In many respects they also agree with *Burchell* 7129 and 5929. The sepals are all bearded, the outer ones conspicuously with long hairs. The receptacle tube is hairy within. The inflorescences at first sight resemble those of *P. montana* (cf. *Rogers* 2956), but they are not always strictly terminal and are distinctly spicate. In *Schlechter* 5846 (*Herb. Bolus.*) the wings of some bracts are distinctly hairy on the back (cf. *Burchell* 5929) and I have seen young leaves in the bud bearing a few hairs behind the apex.

Bolus 11630, Mountain summit, Zwarteberg Pass, 5300 ft., Prince Albert District [between Prince Albert and Oudtshoorn].

Stokoe in *Herb. Bolus.*, Zonder Einda Mts. near boundary between Worcester, Robertson and Caledon Divs.

W. Tyson 77, River banks near Murraysburg, 4000 ft.

Of these three specimens, *Bolus* 11630 has the general appearance of rather stunted *P. obtusifolia*, but the leaves are not blunt, and the inflorescences differ markedly in the obovate or rhombic, reticulately ribbed bracts with a very short point, from which thick wool protrudes conspicuously. *Stokoe's* specimen is past the flowering period and the few bracts left are insufficient for identification. In leaf and habit it is rather like stunted *P. vulgaris*, but the leaves have no wandering fibres. *Tyson* 77 is very stunted in every part. Neither leaves nor sepals are bearded. The bracts are small, ribbed and wrinkled, the leaves short, thick and wrinkled. Without further material it is not possible to place it.

It is worthy of note that these specimens are mostly from mountain summits and outlying localities, where either local species or extreme forms might be expected. Only further collecting in these localities and in others linking them with the main area of distribution of the genus can solve the problems of their identification.

XIX.—ADDITIONS TO THE INDEX KEWENSIS: II.*

The present instalment includes the names of fifty-eight new Mexican species and five new combinations published in Contributions from the U.S. National Herbarium, vol. i, no. 9.

* Continued from *Kew Bull.* 1923, 128.

(1895). These should have appeared in the first Supplement to the Index Kewensis, but this number of the Contributions was somehow overlooked by the compilers, although the remainder of the volume was examined. It may be well to mention that, unlike the original Index and the remaining Supplements, which were compiled at the Kew Herbarium and published by the Clarendon Press, the first Supplement was undertaken as a private venture and published at Brussels, and that it was completed under great difficulties owing to the failing eyesight of one of the authors. References are now given also to the original description by Fournier and the redescription by Vasey of the genus *Gouinia* (*Gramineae*), and to the redescription by Rose of the genus *Agiabampoa* (*Compositae*). The publication of *Gouinia* offers some peculiar features. Fournier sent proofs of his enumeration of Mexican *Gramineae* to Bentham in 1881, and the latter (Gen. Plant. iii. 1178; 1883) based his account of *Gouinia*, which he had not seen, entirely on Fournier's description. But the publication of Fournier's memoir was delayed until 1886. Hence only Bentham's description was cited in the Index Kewensis, since that work did not include references of later date than 1885. Vasey's work on *Gouinia* was overlooked by another American agrostologist, Scribner, who in 1897 proposed the combinations *Gouinia mexicana* and *G. latifolia* (U.S. Dept. Agric., Div. Agrost., Bull. no. 4, 10) which had been published two years previously by Vasey.

The names given below will be included in the sixth Supplement to the Index Kewensis. In view of the large number of new species concerned, however, it seems desirable to publish the list forthwith, for the convenience of students of the Mexican and Central American floras.

Most of the species indexed below were collected in one of the following localities: Agiabampo (in the extreme south of Sonora), Manzanillo, Armeria and Colima (all in the State of Colima). Armeria is a small place halfway between Manzanillo and the city of Colima. Except in a few instances where complete citations are given, the pages cited are those of Contrib. U.S. Nat. Herb. vol. i. no. 9 (1895).

Abutilon bastardioides E. G. Baker ex Rose, 306.—Mexico (Colima).

Acalypha coryloides Rose, 357.—Mexico (Manzanillo).

Acalypha papillosa Rose, 358.—Mexico (Agiabampo).

Agiabampoa Rose (*Compositae*); Rose, 335, descr. ampl.

Agiabampoa congesta Rose; Rose, 335, descr.—Mexico (Agiabampo).

Argithamnia manzanilloana Rose, 357.—Mexico (Manzanillo).

Ayenia manzanilloana Rose, 309.—Mexico (Manzanillo).

Brickellia colimae Rose, 333.—Mexico (Colima).

Bumelia arborescens Rose, 339.—Mexico (Colima).

Canavalia acuminata Rose, 322.—Mexico (Manzanillo).

Capparis Palmeri Rose, 301.—Mexico (Manzanillo).

- Cardiospermum spinosum* *Radlkofer*, 368.—Lower California (La Paz).
- Cassia manzanilloana* *Rose*, 325.—Mexico (Manzanillo).
- Ceiba grandiflora* *Rose*, 308.—Mexico (Manzanillo).
- Celosia monosperma* *Rose*, 352.—Mexico (Manzanillo).
- Cienfuegosia Palmeri* *Rose*, 308.—Mexico (Colima).
- Crataeva Palmeri* *Rose*, 301.—Mexico (Armeria).
- Drymaria procumbens* *Rose*, 304.—Mexico (Colima).
- Encelia purpurea* *Rose*, 336.—Mexico (Colima).
- Euphorbia colimae* *Rose*, 356.—Mexico (Colima).
- Euphorbia sonorae* *Rose*, 356.—Mexico (Agiabampo).
- Flaveria robusta* *Rose*, 337.—Mexico (Colima ; Armeria).
- Forchhammeria Watsoni* *Rose*, 302.—Mexico (Sonora ; Lower California).
- Gaya minutiflora* *Rose*, 305.—Mexico (Colima).
- Gouinia* *Fourn. ex Benth.* ; *Fourn. Mex. Pl. Gram.* 103 (1886) ; *Vasey apud Rose*, 364, descr. emend.
- Gouinia latifolia* *Vasey apud Rose*, 365 : *Tricuspis latifolia*.
- Gouinia mexicana* *Vasey apud Rose*, 365 : *Leptochloa mexicana*.
- Gouinia polygama* *Fourn. Mex. Pl. Gram.* 103 (1886) ; *Vasey apud Rose*, 365, descr. ampl.—Mexico (Vera Cruz ; Colima ; Guerrero ; Oaxaca). Recorded also from Yucatan (*Millsp. in Publ. Field Columb. Mus., Bot.*, iii. 57 ; 1903).
- Heteropteris Palmeri* *Rose*, 311, in adnot.—Mexico (Alamos).
- Hiraea mexicana* *Rose*, 312.—Mexico (Armeria).
- Ipomoea Nelsoni* *Rose*, 343.—Mexico (Manzanillo ; Tuxtepec, Oaxaca).
- Ipomoea Wolcottiana* *Rose* ; *Rose* 343, descr.—Mexico (Manzanillo). The species was first published in *Garden and Forest*, vii. 367 (1894). As that periodical is not accessible to many botanists, it seems desirable to add the second reference.
- Jacobinia auriculata* *Rose*, 349.—Mexico (Colima).
- Jatropha purpurea* *Rose*, 357.—Mexico (Agiabampo).
- Justicia mexicana* *Rose*, 348.—Mexico (Agiabampo).
- Justicia paniculata* *Rose*, 348.—Mexico (Colima).
- Karwinskia parvifolia* *Rose*, 315.—Mexico (Agiabampo).
- Krameria Palmeri* *Rose*, 304.—Mexico (Agiabampo).
- Leucaena macrocarpa* *Rose*, 327.—Mexico (Jalisco).
- Lonchocarpus Palmeri* *Rose*, 322.—Mexico (Manzanillo).
- Malpighia guadalajarensis* *Rose*, 310, in adnot. : *Bunchosia guadalajarensis*.
- Malpighia ovata* *Rose*, 310.—Mexico (Manzanillo).
- Malpighia umbellata* *Rose*, 310.—Mexico (Agiabampo).
- Malpighia Watsoni* *Rose*, 310, in adnot. : *Bunchosia parvifolia* *S. Watson*. The specific name had to be changed on account of the previously published *Malpighia parvifolia* *Juss.* *M. Watsoni*, however, is now reduced to *M. ovata* by Small (*N. Am. Fl.* xxv. 155).

- Mimosa leptocarpa* Rose, 326.—Mexico (Manzanillo).
Mimosa manzanilloana Rose, 326.—Mexico (Manzanillo).
Panicum Pringlei Vasey *apud* Rose, 363.—Mexico (Jalisco; Colima). Overlooked by Scribner, who described it as a new species *Ixophorus Pringlei* (U.S. Dept. Agric., Div. Agrost., Bull. 4, 6; 1897), and by Hitchcock, who reduced *I. Pringlei* to *I. unisetus* (Presl) Schlecht. (Contrib. U.S. Nat. Herb. xvii. 265; 1913). According to Hitchcock the species occurs also in the States of Tepic, San Luis Potosi, Morelos and Guerrero, and in Central America.
Paullinia sessiliflora Radlkofer *apud* Rose, 317.—Mexico (Colima; Manzanillo).
Piper Palmeri C.DC. *apud* Rose, 354.—Mexico (Colima).
Piper Palmeri var. *manzanilloanum* C.DC. *apud* Rose, 354.—Mexico (Manzanillo).
Piptadenia leptocarpa Rose, 325.—Mexico (Manzanillo).
Porophyllum Palmeri Rose, 338.—Mexico (Colima).
Sassafridium macrophyllum Rose, 355.—Mexico (Manzanillo).
Schrankia diffusa Rose, 327.—Mexico (Manzanillo).
Serjania albida Radlkofer, 367.—Lower California (Santa Agueda).
Serjania brachylopha Radlkofer, 367.—Mexico (Tequila, Jalisco).
Serjania fuscopunctata Radlkofer *apud* Rose, 315.—Mexico (Manzanillo).
Serjania rutaefolia Radlkofer *apud* Rose, 316.—Mexico (Agiabampo).
Serjania trifoliolata Radlkofer *apud* Rose, 317.—Mexico (Manzanillo).
Spigelia Palmeri Rose, 342.—Mexico (Manzanillo).
Tephrosia multifolia Rose, 320.—Mexico (Manzanillo).
Tetramerium aureum Rose, 349.—Mexico (Colima).
Tetramerium diffusum Rose, 349.—Mexico (Manzanillo).
Tetramerium tenuissimum Rose, 349.—Mexico (Colima).
Tridax dubia Rose, 337.—Mexico (Colima).
Wissadula hirsutiflora Rose, 306: *Bastardia hirsutiflora*.
Xylosma horrida Rose, 303.—Mexico (Manzanillo).
Xylosma Palmeri Rose, 303.—Mexico (Manzanillo).
Zizyphus mexicana Rose, 315.—Mexico (Armeria).

XX.—MISCELLANEOUS NOTES.

MR. J. W. WRIGHT, a member of the gardening staff of the Royal Botanic Gardens, Kew, has been appointed by the Secretary of State for the Colonies, Assistant Curator, Dominica.

LIEUT. A. S. RICHARDSON, B.Sc., has been appointed by the Secretary of State for the Colonies, District Agricultural Officer, Tanganyika Territory.

DR. L. A. PERINGUEY.—We regret to learn of the death on 20th February last of Dr. L. A. Peringuey, Director of the South

African Museum, Cape Town, and a regular correspondent of Kew. Although Dr. Peringuey was first and foremost a Zoologist, he was a man of remarkably wide interests, and indirectly did much to promote the study of botany in the Union. Some years ago he generously allowed Dr. E. P. Phillips, when his botanical assistant, to visit Kew for a year in order to elaborate the *Proteaceae* for the Flora Capensis, and lately the present occupant of the same post has spent a similar time at Kew preparing a Catalogue of the Flora of the South Western Protectorate, the completion of which Dr. Peringuey had very much at heart.

Dr. Peringuey was a leading authority on Entomology and Anthropology in South Africa, and was well known for his valuable studies on the antiquity of man in that region. One of the most remarkable of the many attractions of the South African Museum is his life-size models of the almost extinct race of bushmen. His papers ranged from an exhaustive descriptive catalogue of the *Coleoptera* of South Africa, begun in 1885 and occupying several volumes of the Journal of the South African Philosophical Society, to a study of the whales frequenting Cape waters and a treatise on insects injurious to forest trees. He dominated for many years zoological research at the Cape, and took a leading part in the foundation of the Royal Society of South Africa in 1908, being president from 1912 to 1917. He was also a member of the Entomological Society of London and of the Société Entomologique de France, as well as the South African representative for the International Catalogue of Scientific Literature.

J. H.

PRINCE ROLAND BONAPARTE.—We regret to record the death of Prince Roland Bonaparte, which took place in Paris on the 14th of April, 1924, in his 66th year. He was a grandson of Lucien Bonaparte, the second brother of Napoleon the First. Possessed of substantial private means and debarred (as he once wrote during the War) from serving his country in the army as he wished to do in his early life, he turned his attention to scientific studies, especially anthropology, geology, geography and natural history. In connection with these he made expeditions to America, Mexico, Finland and Lapland. In later years he turned his attention to ferns and became a frequent correspondent of Kew. He amassed a large herbarium of ferns, and, where specimens of rare species could not be obtained, he filled the gaps by procuring photographs of type specimens. From time to time he published reports on collections he acquired under the title of "*Notes Ptéridologiques*," the first fascicle of which appeared in July, 1915, at which time he estimated his herbarium to contain about 300,000 specimens from all parts of the globe. Not only was he a worker himself and described new species, but also a generous patron of scientific work, giving financial assistance to such objects as marine laboratories.

geological stations, observatories and scientific journals, and it was at his expense that Supplement II of Dr. Carl Christensen's "Index Filicum" was published. Kew has been indebted to him for interesting collections from Mexico and Spain, and by his death has lost a valued correspondent.

Gift of Garden Seats.—The amenities of the Gardens have recently been greatly enhanced by the very generous gift of one hundred seats, by a gentleman who desires to remain anonymous. The seats, which are designed for two persons, are made of strips of teak bolted on to iron supports and are of a comfortable shape, beautifully made, and of a very neat design.

Imperial Botanical Conference.—The following are the principal subjects arranged for discussion at the Conference which will be held at the Imperial College of Science and Technology from July 7th–16th.

I.—Systematic Botany and Ecology. The best means of promoting a complete Botanical Survey of the different parts of the Empire; Correlation of Taxonomic Work in the Dominions and Colonies with work at home; Vegetation Survey in different parts of the Empire, and Training in Field Ecology.

II.—Genetics. The Economic Possibilities of Plant Breeding; The value of Selection Work in the Improvement of Crop Plants.

III.—Plant Physiology. Cold Storage of Apples, an economic biological problem: Crop Physiology, modern methods of attack.

IV.—Plant Pathology. Obscure Plant Diseases of Widespread Occurrence; The Relation of Plant Pathology to Genetics; The Relation of Forest Pathology to Silviculture.

V.—Education and Research.

VI.—Miscellaneous. Wood Technology; Nomenclature. Lectures—Prof. A. C. Seward, F.R.S., "Records of Ancient Plants within the Empire"; Mr. F. A. Stockdale, "The Peradeniya Botanic Gardens"; Dr. J. M. Dalziel, "The Economic Botany of West Africa." Papers.

Excursions have been arranged as follows: The Royal Horticultural Society's Garden, Wisley; John Innes Horticultural Institution, Merton; Blakeney Point, Norfolk; Rothamsted Experimental Station; Royal Botanic Gardens, Kew, and Cambridge.

Further particulars can be obtained from the Secretary, Mr. F. T. Brooks, 31, Tenison Avenue, Cambridge.

The Genus *Dicoma*.—My attention has been drawn to a breach of the International Rules of Nomenclature in my paper "Revision of the Genus *Dicoma*" (*K.B.* 1923, p. 377), which I would like to take this opportunity to correct. The three

sections I there recognised should have borne the following names :—

Sect. I.—*LEUCOPHYTON* (Less.) Endl. Gen. i. 487 (1838).—Subgen. *Leucophyton* Less. Syn. Compos. 109 (1832). Sect. *Eudicoma* DC. Prodr. vii. 36 (1838). Sect. *Steirocoma* DC. l.c., partim; Harv. in Harv. et Sond. Fl. Cap. iii. 515, partim. Sect. *Microcoma* DC. l.c. 306. Sect. *Dimorphae* F. C. Wilson in Kew Bull. 1923, 377.

Original species : *D. capensis* Less. and *D. tomentosa* Cass.

Sect. II.—*MACLEDIUM* (Cass.) DC. l.c. 37; Endl. l.c.; Harv. l.c.; emend. F. C. Wilson.—Genus *Macledium* Cass. in Dict. Sc. Nat. xxxiv. 39 (1825). Subgen. *Macledium* Less. l.c. 110. Subgen. *Rhigiothamnus* Less. l.c. 109. Sect. *Rhigiothamnus* DC. l.c.; Harv. l.c. Sect. *Psilocoma* Harv. l.c. Genus *Brachyachaenium* Baker in Journ. Linn. Soc. Bot. xxv. 330 (1890). Sect. *Brachyachaenium* O. Hoffm. in Engl. Jahrb. xv. 545 (1893). Sect. *Barbellatae* F. C. Wilson l.c.

Original species : *D. relhanioides* Less., *D. diacanthoides* Less., and *D. Burmanni* Less.

Sect. III.—*PTEROCOMA* DC. l.c.; Endl. l.c. ii. 1386; Harv. l.c.; O. Hoffm. l.c. 546.—Sect. *Plumosae* F. C. Wilson l.c.

Original species : *D. speciosa* DC.

For purposes of priority, subgenera and sections are treated in the Rules as belonging to the same "rank." *Leucophyton*, *Eudicoma*, *Steirocoma*, and *Microcoma* all appeared as sectional names in 1838. *Leucophyton*, however, dates from 1832, when it was published as a subgenus, and consequently has priority over the other names.

I would also like to take this opportunity of thanking Mr. J. Hutchinson for his help and advice during the preparation of my paper, as this acknowledgment was inadvertently omitted.

F. C. W.

Scientific Expedition to the South Pacific.—The First Expedition organised by the Scientific Expeditionary Research Association left Dartmouth on April 9th, 1924, for the South Pacific on board the S.Y. St. George. The expedition will be calling at Madeira and Trinidad and after passing through the Panama Canal will call at Malpelo and Gorgona and also at Albemarle Island (Galapagos). Easter Island, Pitcairn Island and other Pacific Islands will also be visited. Mr. L. A. M. Riley, who has been working for some time in the Herbarium, is the botanist on the scientific staff of the expedition, and the first set of botanical specimens collected in the Pacific will be presented to the Royal Botanic Gardens.

Botanical Magazine.—The second part of volume 149 (1923) was published on March 3rd, 1924, and contains eleven figures representing the following plants :—*Primula suffrutescens* A. Gray (t. 8990), a native of the Sierra Nevada, California; *Schizophragma integrifolium* Oliv. (t. 8991), from Central and

Western China; *Hardenbergia Comptoniana* Benth. (t. 8992), from Western Australia; *Rhododendron Searsiae* Rehder and Wilson (t. 8993), also from China; *Lithospermum oleifolium* Lapeyr. (t. 8994), a native of the Pyrenees; *Thryptomene thymifolia* Stapf (t. 8995), from Australia; *Epidendrum Cristobalense* Ames (t. 8996), from the mountains of Costa Rica; *Lavatera bicolor* Rouy (t. 8997), from the French Riviera; *Callistachys ovata* Sims (t. 8998), from Western Australia; *Cotoneaster salicifolia* Franch. (t. 8999), from Western China; and *Amorphophallus cirrifer* Stapf (t. 9000), a native of Siam.

Across the Great Craterland to the Congo.*—To the botanist the most interesting part of Mr. Barns' book is the series of excellent plates which give a very fine presentation of the types of vegetation he encountered among the giant craters in Tanganyika and in the tropical forests of the Congo. The detail of the photographs is so good that in many cases it was possible to identify the plants portrayed from prints sent to Kew by Mr. Barns. This, to a large extent, compensates for the meagre references to the vegetation in the text, and it is much to be regretted that the expedition was unable to make representative collections of the flora of the very interesting and little-known areas through which they passed. The work will form a welcome addition to preliminary studies of the types of vegetation of the area traversed. A copy of the work has been very kindly presented to Kew by the author.

A Handbook of Cultivated Plants.†—"The purpose of this book is to provide a ready means for the identification of the species in the usual domestic flora of the continental United States and Canada." It is a handy octavo volume of 851 pages, and contains descriptions of 3,665 species under 1,246 genera. Most floras deal either superficially or not at all with the plants which are merely cultivated in their areas, and the material of important cultivated species preserved in herbaria is often very imperfect. Hence the identification of plants which are known only in cultivation has hitherto presented great difficulties. This task will be much facilitated by the excellent keys and descriptions provided by Dr. Bailey in the work under review. The genera *Phaseolus* and *Cucumis* may serve as illustrations. Under the former are descriptions of the Kidney Bean, Scarlet Runner, Sieva Bean, Lima Bean, Urd (Black Gram), Mung (Golden Gram), Adzuki, Rice and Moth Beans, and of several varieties. The latter includes besides the Bur Gherkin, Hedgehog Gourd and Cucumber, descriptions of seven different horticultural varieties of Melon. The treatment of ornamental plants

* By Alexander Barns, with an introduction by J. W. Gregory. Ernest Benn, Ltd., London; pp. 276, ill. 82, maps 2; 1923; 25s.

† Manual of Cultivated Plants. By L. H. Bailey. New York and London: Macmillan & Co. 1924. Price £1 11s. 6d. net.

is equally satisfactory. The tuberous begonias of gardens are grouped together as *Begonia tuberhybrida* Voss, which is what Bailey designates as a *cultigen*, namely, a group which has originated in cultivation, and is more or less comparable, as regards the importance of its differential characters, with a wild species. Similarly the orchid-flowered horticultural races of *Canna* (e.g., *Italia*) are classed together under the name *C. orchiodes*, while the common flowering Cannas are included in the cultigen *C. generalis*. The families are arranged according to the Engler-Prantl system, and the generic and specific names follow the International Rules. Full use has been made of the page headings, which bear the name of the family in the centre, with the first and last genera to left and right respectively. There is only one index, including both common and scientific names. It only remains to add that a high standard is maintained throughout the work, and that it will serve to enhance the reputation of its author.

T. A. S.

Wild Flowers of Kashmir*.—By the publication of this book Mr. B. O. Coventry gives visitors, even those who are not familiar with botanical terms, an opportunity of an acquaintance with the rich flora of Kashmir. After an introduction containing an explanation of the meaning of the technical words used he presents 51 plates reproduced in natural colours from Lumière autochromes taken in the field by himself. A technical description as well as notes on the peculiarities and uses of the plants accompany each plate. Mr. Coventry is to be warmly congratulated on this publication especially in regard to the production of the autochrome plates which requires considerable skill and perseverance. The succeeding series of this work will be awaited with interest.

S. T. D.

The Flower Seeker.†—This is an attempt by means of simple language and illustrations to enable the common wild flowers to be identified. The plants are classified according to their habitats and flowering seasons. The first 36 pages contain a key founded on obvious features and are followed by more detailed descriptions. The book should be useful to those who wish to identify wild flowers without technical descriptions.

Garden Operations, 1923.—In the report under this heading in *K.B.* 1924, p. 30, *Cladrastis tinctoria* Hemsley should read *Cladrastis sinensis* Hemsley.

* Wild Flowers of Kashmir (Series 1), B. O. Coventry. Raithby, Lawrence & Co., London, 1923, pp. xxxii, 102, 51 coloured plates, Price 15s.

† The Flower Seeker, by Forster Robson. Sm. 8vo. 184 pp., 16 plates and many text figures. Cassell & Co., Ltd. Ed. 2: London, 1924. 3s. 6d.